

MXL QM/EVO3QM

User Manual



Dear MXL / EVO3 QM Owner

AIM has created technical instruments specifically for the exciting world of jr. dragsters: AIM **MyChron3 660** is considered today the most powerful data logger designed for this kind of vehicles.

Our expertise in the dragster environment now lead to offer a new set of Products designed for drag racing, like the **MXL QM** dash logger and **EVO3 QM** data logger. Professional tools to meet drag heroes needs!

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Chapter 1 – AIM QM World

1.1 – QM Products Family

MXL QM has been engineered to help you increase your dragster consistency and overall performance. **MXL QM** is a high tech digital dash for your vehicle with plenty of channels and capable of the easiest connection to the most important ECUs on the marketplace.

QMs are specifically designed for Full Scale Dragsters, basing on eighth mile and quarter mile.

QMs store runs starting with a manual switch - following NHRA rules - and can log RPM, up to 4 speed inputs, up to 12 analog channels and extended channels from an ECU interface (via CAN bus or RS232). All the setup is easily performed through the AIM **DragOn** software.

A whole racing week-end data can also be reviewed directly on the wide backlighted display, for immediate evaluation of the most important measures at the time slip times.

QMs can be interfaced (via Proprietary CAN bus) with virtually infinite AIM **LCU-One** lambda controllers.

There is virtually no limit to the sensors that can be connected to QMs: engine rpm sensors, clutch rpm sensors, driveshaft rpm sensors, speed sensors, EGT (k-thermocouples), thermo resistors, pressure transducers for oil, water and brake, potentiometers, accelerometers, gyrometers.

All data are logged into the internal 8-16 MB flash memory (depending on QM version) and can be downloaded to the PC through USB connection or a powerful **DataKey**, both via the **QMConnect** software. AIM **QMA**n powerful software lets you create your personal Elapsed Time database and analyze performance data.

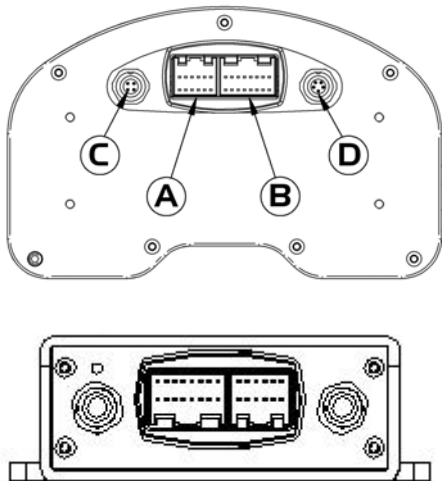
Both **DragOn** and **QMA**n software are available also on website www.aim-sportline.com website.

If you want to stay up to date with latest releases, please refer to our download section. After downloading, double click the file and follow Prompted instructions.

Your QM **Pista/Pro** records both your and your vehicle's performances in detail. We present the QM in two versions:

QM Pista

- 8MB Memory
- 8 Analog channels
- 1 Digital speed input
- 2 AMP Connectors (12pins – 16pins)



A – B: 12+16 AMP connectors

These connectors Provide:

- Power supply
- ECU connection (via CAN and RS232 Protocol)
- Analog inputs
- USB communication

C: 4 pins binder connection

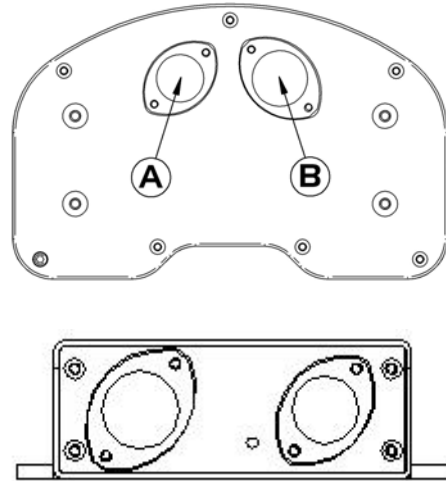
This connector Provides “Data Acquisition Switch” connection

D: 5 pins binder connector

This connector Provides “CAN for Exp. Modules” channel connection

QM Pro 05

- 16MB Memory
- 12 Analog channels
- 4 Digital speed inputs
- 2 Professional Autosport Connectors (22pins – 37pins)



A: 22 pins DEUTSCH connector

This connector Provides:

- Power supply
- ECU connection (via CAN and RS232 Protocol)
- USB communication
- “External shift light” connection
- “CAN for Exp. Modules” connection
- Speed Channel #3 - #4

B: 37 pins DEUTSCH connector

This connector Provides:

- Power supply
- “Data Acquisition Switch” connection
- RPM signal
- Speed Channel #1 - #2
- Analog inputs

Both of them have non-volatile Flash internal memory that keeps stored data even when power is off.

1.2 – QMs Kits

AIM has developed two QM kits to fit various situations; the table below shows the standard equipment in each kit as well as optional equipment.

MXL/EVO3 QM Pista

- **MXL/EVO3 QM Pista**
- Start acquisition switch
- AMP harness with
- 4 Thermocouple inputs
- 4 analog channel inputs
- 1 speed channel input
- 1 Speed sensor
- USB Cable + QM Softwares
- This manual

MXL/EVO3 QM Pro 05

- **MXL/EVO3 QM Pro 05**
- Start acquisition switch
- 37 pins harness with
- 8 Thermocouple inputs
- 2 speed channel inputs
- 22 pins harness with
- 2 speed channel inputs
- 2 Speed sensors
- USB Cable + QM Softwares
- This manual

Part Numbers

MXL QM Pista: X16MXLCQM

EVO 3 QM Pista: X20EVO3CQMO

MXL QM Pro 05: X16MXLPQM

EVO 3 QM Pro 05: X20EVO3PQMO

1.3 – Optional

LCU One



LCU-One uses a wide band Bosch LSU 4.9 sensor and measures Lambda values from 0.65 to 1.6. This allows a much more accurate monitoring, which leads to a better setup of your engine and, in particular, of your injection.

Data Hub



AIM developed **Data Hub**, the new CAN connection multiplier that works as an interface between AIM Logger (**MXL QM/EVO3 QM**) and its peripheral equipments.

Each Hub connects the logger with four peripherals: i.e. **LCU lambda controller**, and one or more **TC Hub** (thermocouples multiplier).

You can of course use more Data Hub in series to have all connections you want. Data Hub takes all the information you need to your logger with only one cable, minimizing wires overall.

TC Hub



TC Hub is the new thermocouples multiplier.

Each **TC Hub** allows you to connect via CAN bus four additional thermocouples to your QM logger: you can of course use more **TC Hub** to have all desired temperature sensors at your disposal.

With **TC Hub** you can keep regularly under control exhaust gas temperature (EGT) of each cylinder in addition to water, oil and cylinder head temperature (CHT).

Moreover, thanks to **TC Hub**, wires overall is reduced to the minimum.

External shift light



Used to warn the racer on the upshift needs.

1.4 – EVO3 displays

These are the available displays for the **EVO3** units.

TG dash



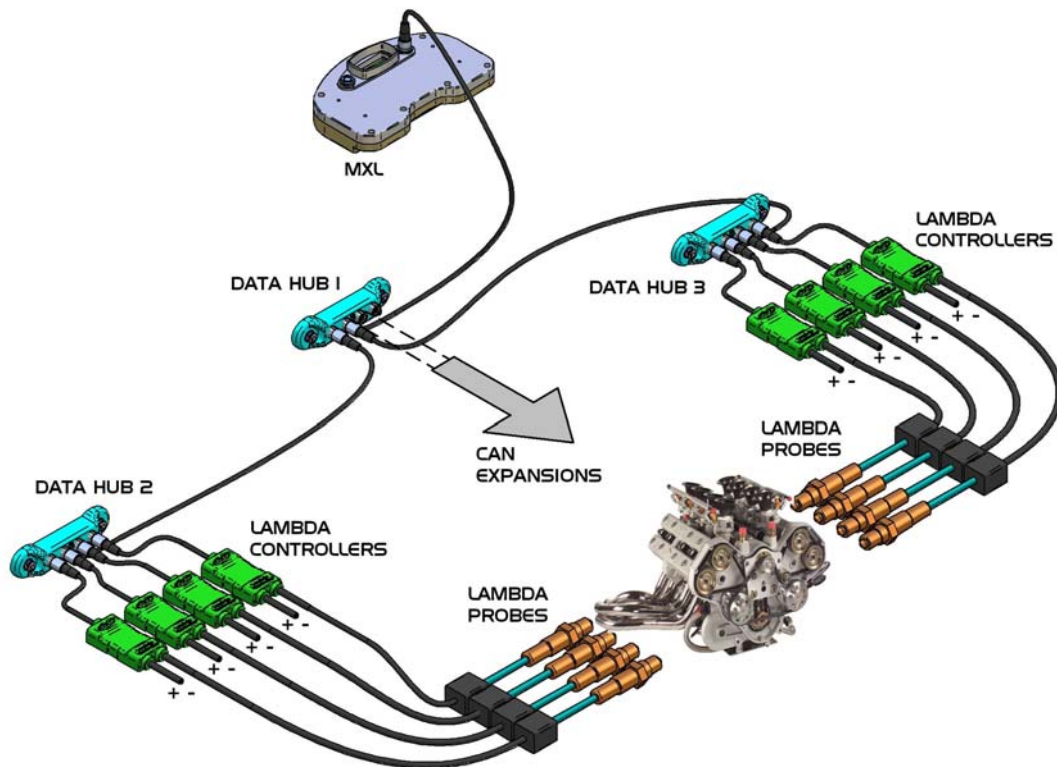
M3 dash



Formula Steering Wheel



1.5 – AIM Network



AIM Products can communicate each other using CAN technology. This is an example of **MXL** supporting 8 **LCU One** Lambda controllers through 3 Data Hubs but it is possible to have as many solutions as needed.

This guide is divided into five main sections, facing the main issues commonly found in the Product use. These issues are exposed using the natural order of the Product use.

1. Installation of QM Products
2. Configuration
3. Race!
4. Download
5. Analysis

Chapter 2 – Installation of QM Products

We're going to guide you into the installation of our Products. Please mind that a complete installation of a QM Products requires specific knowledge of vehicle electronics.

2.1 – Gauge-Data logger

This section guides you into the major issues that you'll be facing while installing the gauge or the data logger.

Before installing, please define your installation final user between Mechanic or Driver. Nothing will change except your **MXL** and acquisition switch onboard location. Drivers typically use **MXL** as a replacement of stock dash while Mechanics place **MXL** in an easily viewable and reachable point. This info does not apply to **EVO3** because there's no display.

Either **MXL** or **EVO3** must be kept away from heat sources and vehicle's fluids, like any other race electronics instrumentation.

As told before, **MXL** and **EVO3** can be installed almost everywhere on the vehicle but, in order to avoid electromagnetic noise, keep it away from coil and all ignition system components working in high voltage mode. High voltage noise is a common Problem of all electronic instrumentations.

2.2 – How to connect to your ECU

AIM Products like your QM **Pista/Pro** can be interfaced to most racing Engine Control Unit (ECU) using a RS232 serial cable or a CAN cable in order to collect data out coming from the ECU itself. To know if your ECU is supported by QM **Pista/Pro** and for further information about QM – ECU connection, please refer to our website.

As long as ECU manufacturers update their Products constantly, refer to our website for latest information and refer to your ECU's manual to ensure that pin connection is correctly set.

ECU communication is made of few wires (two/three) to be connected, follow specific ECU documentation that can be found on our website.

Using ECU communication you will be able to acquire a wide range of data without installing any additional sensors.

2.3 – How to install and power the acquisition switch

The manual acquisition switch (shown on the right) has ON / OFF positions. When both engine and MXL are turned on, with the acquisition switch in “OFF” position, the **MXL** shift light led blink sequentially, warning that **MXL QM** is in idle condition but is not acquiring data. Turning the acquisition switch ON will turn shift light led off and start data acquisition. Turning the switch OFF will stop data acquisition and push the system back to idle condition.



This is an example of acquisition switch installation.

In this case, the crew chief will turn the acquisition switch on just before the car starts for the run.

Part Number: X05DCHGF0



2.4 – Sensors

This section gives you info about of all the sensors that can be connected to our data loggers.

- engine rpm sensors
- clutch rpm sensors
- driveshaft rpm sensors
- speed sensors
- EGT (k-thermocouples)
- Thermo resistors
- pressure transducers for oil, water, fuel and brake
- potentiometers
- accelerometers

Warning: please remember to ground system/sensors with the battery in order to avoid system/sensors failures

Chapter 3 – Configuration of QM Products

The configuration is done through our DragOn software. The configuration software is rich of features as our Products are among the most powerful loggers in the world, plenty of different possibilities.

Our advise is to practice our software before starting using its advanced configuration possibilities.

To run **DragOn** or **QMA**n software you may either:

- Double click the aside desktop icons



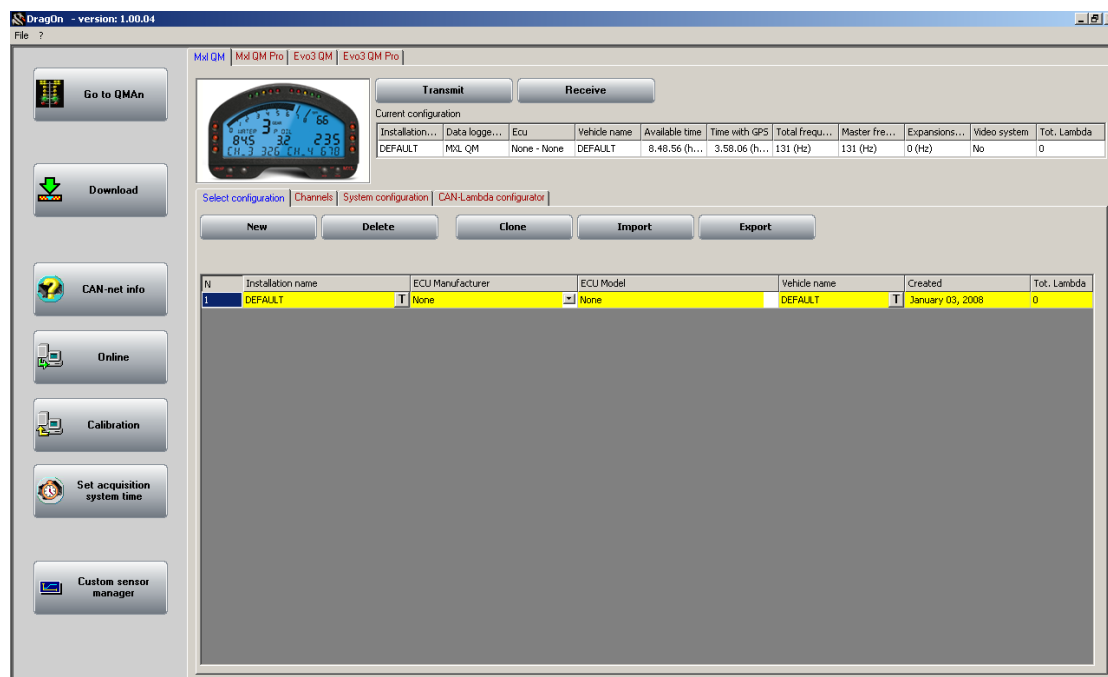
DragOn



QMA

- Click one of the shortcuts: Start \ Program \ AIM Racing Data Power \ Dragster \ DragOn or Start \ Program \ AIM Racing Data Power \ Dragster \ QMA

The following screenshot shows you **DragOn** software layout.



The left software toolbar includes several command buttons that will be explained in the following pages.

The center-right part of the window features a tab with an item for every QM Product: **MXL QM**, **MXL QM Pro**, **EVO3 QM**, **EVO3 QM Pro**. All the tabs will feature mostly the same possibilities for all QM Products. The correct picture of every gauge will be displayed as soon as you select the tab.

DragOn software features a configuration database, particularly useful to drivers and Pro-installers: as a driver, you will be able to keep 2 (or more) configurations for every kind of race (qualify, shoot-outs, eliminations). On the other side, Pro-installers may find it useful to trace customer's configurations for troubleshooting purposes.

Every configuration in the PC database can be sent to the data logger to Program its use (transmit), and it is possible to check the configuration of a data logger copying it from the data logger to the database on your PC (receive).

To transmit configurations:

Connect your instrument to the USB port of your PC using the included USB cable and turn your logger on.

Click the “Transmit” button. This operation will DELETE all your stored runs on logger’s memory, so please ensure to download your data before transmitting configurations.

To receive configurations:

Connect your instrument to the USB port of your PC by using the included USB cable and turn your logger on.

Click “Receive”. Your configuration database will be incremented by one. The last configuration (at the bottom) is the one you just received.

The lower part of the software features another tab control, each items of which will be explained now. The differences within these items among the QM Products will be evidenced.

3.1 – Select configuration

As already explained our software features a configuration database to trace all your possible data acquisition layouts. In the “Select configuration” tab you can create, delete or modify configurations’ basic settings.

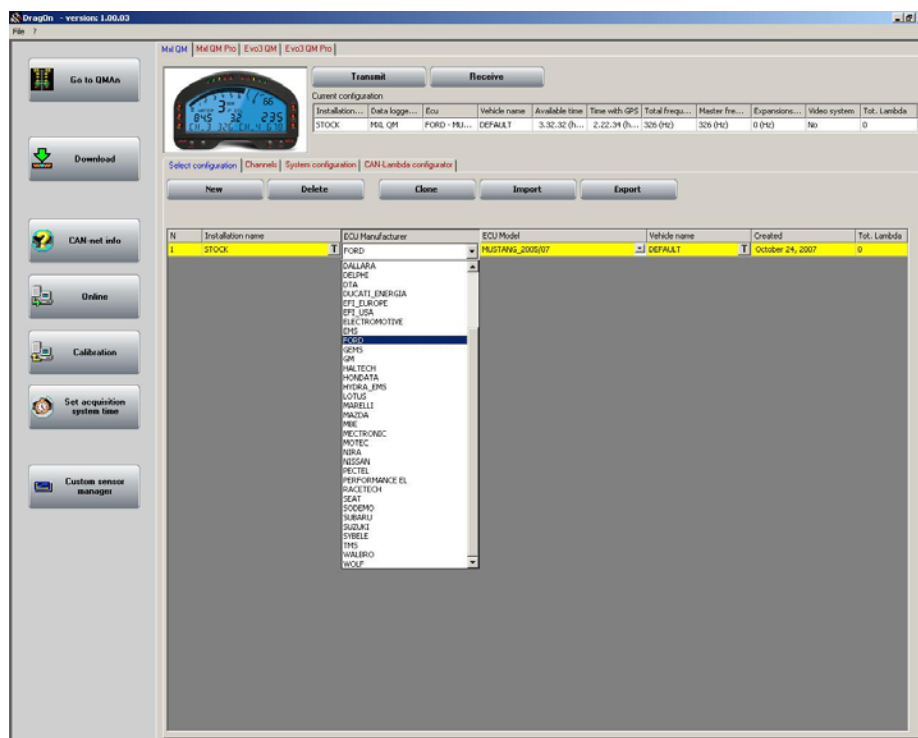
The commands available for configuration management are:

- **New** – Create a new configuration layout
- **Delete** – Delete an existing configuration
- **Clone** – Copy an existing configuration
- **Import** – Import a configuration from File to Database (e. with the aim of moving it from another PC to your Database)
- **Export** – Export a configuration from Database to File (e. with the aim of moving it from your Database to another PC)

The columns in the configuration grid are:

- **N** – the creation number of the configuration
- **Installation Name** – a name that keeps the configuration easily identifiable
- **ECU Manufacturer** – if you connect our Product to an ECU, choose the ECU manufacturer name, otherwise select **None**
- **ECU Model** – the model of the ECU
- **Vehicle Name** – useful for installers who want to track where a configuration is used
- **Created** – creation date of the configuration
- **Tot. Lambda** – how many LCU-One the system is connected to

Some fields implement an “in place edit”, some other open some combo boxes, as shown in the following screenshot.

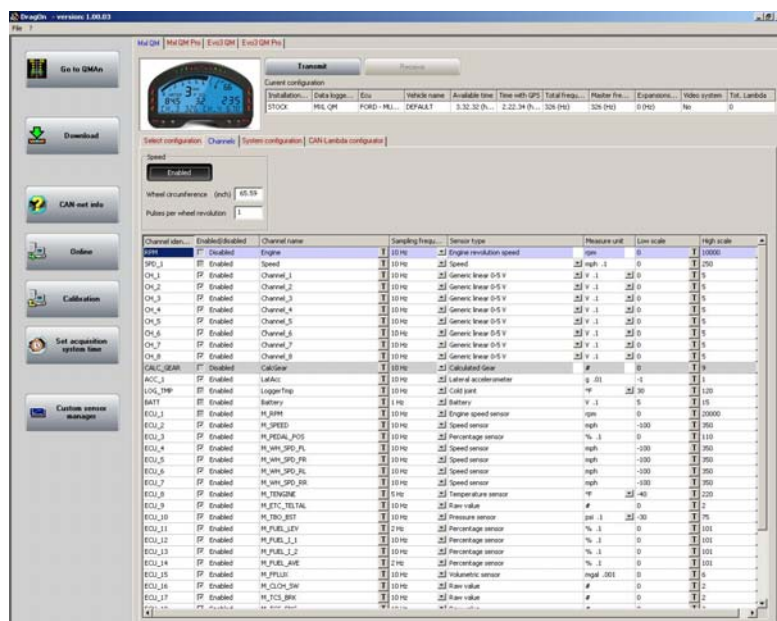


3.2 – Channels

You have to instruct the data logger in order for it to know what are the sensors it's getting information from, channel by channel.

As shown in the screenshot, for every channel the following fields are shown:

- **Channel identifier** – this identifier cannot be changed as it is meant to match the channels' names on logger's hardware.
- **Enabled\Disable** – to satisfy every driver's needs, you can select the channels you're interested to acquire data from. Enabled means it will be sampled, disabled will not be logged.
- **Channel name** – every channel has a pre-defined name that can be customized (e. Water T for water temperature).
- **Sampling frequency** – how many samples per second the logger will do for the channel.
- **Sensor type** – the sensor installed (or that you are going to install) on the related channel, every sensor has its own features, so the logger must be Programmed to know what is connected in order to sample the correct information
- **Measure unit** – The measure unit of the installed sensor
- **Low Scale / High Scale** – The minimum and maximum value that will be viewed in graphical form during Analysis Process.



Note about sampling frequency: higher is the total sampling frequency, higher is the memory consume rate. A frequency of 100Hz on a channel means that the value is being sampled 100 times for second. A default sampling frequency value (depending on sensor's type) is present, please consider your needs before changing it. This may impact on the quantity of runs you can store into your **MXL**.

QMs can acquire up to 2000Hz of total sampling (max 500Hz per channel, depending on channel's type: for example, due to their limits, thermocouples cannot sample more than 100Hz).

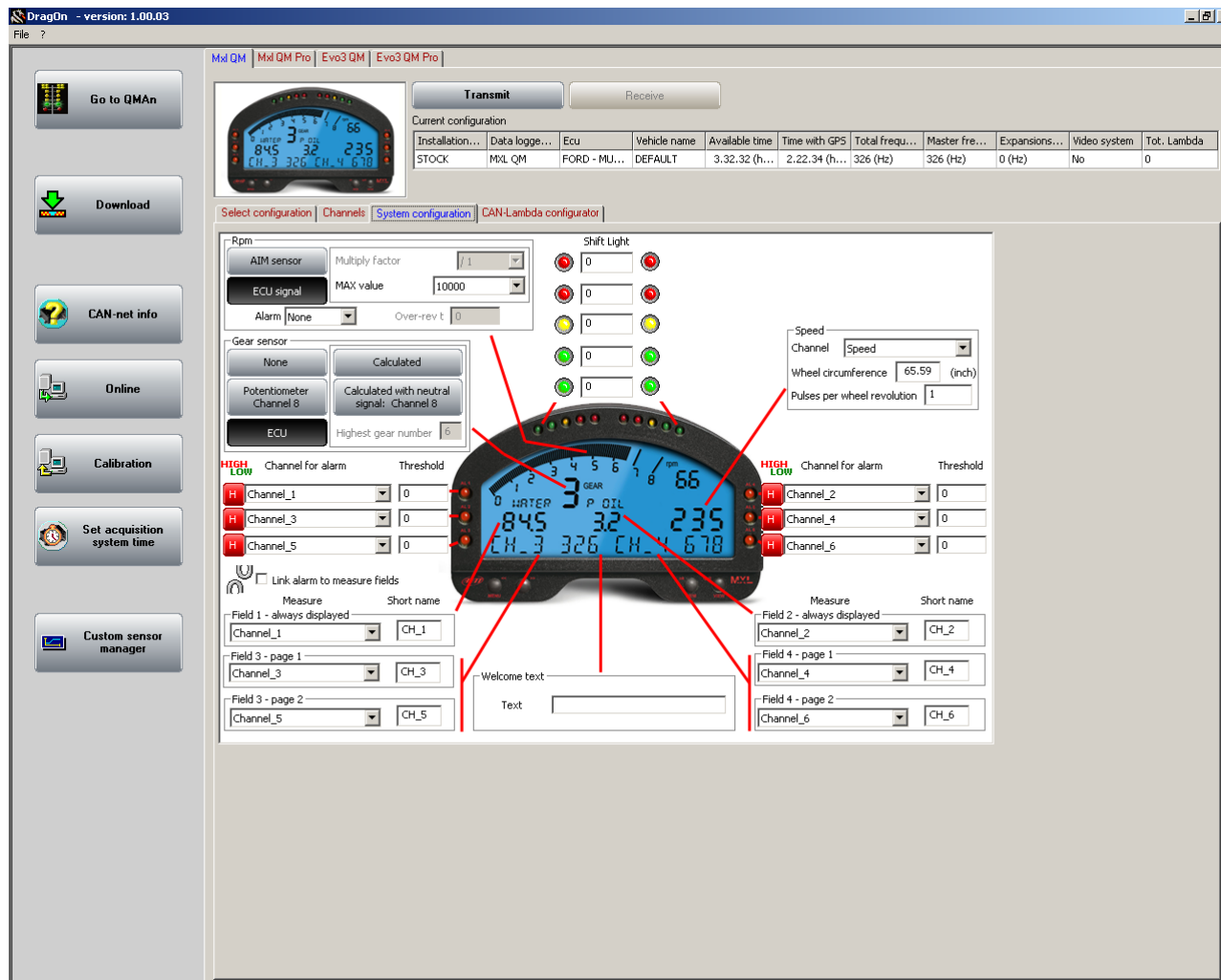
Some channels need additional information to Properly sample the information. It is the case of the speed channel shown at the top of the list in the above screenshot.

3.3 – System configuration

This tab behaves differently for **MXL** and **EVO3**.

Programming the gauge is the main operation for getting the right information at the right place on the display. All the features bound to the display are not shown in the case of an **EVO3**, as they will be displayed in the “Display” tab.

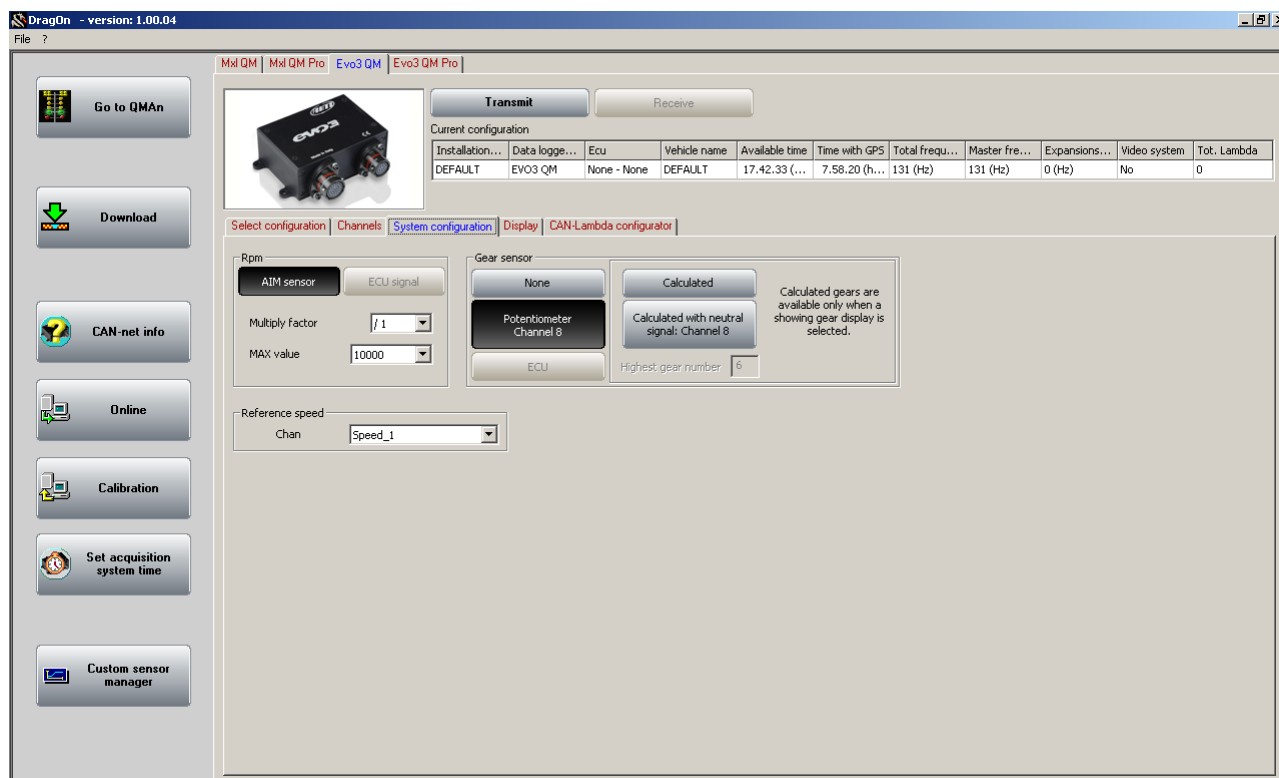
3.3.1 – MXL



In this tab it is possible to set:

- **RPM** – some parameters on the rpm channel.
- **Gear sensor** – where is the channel sampled from and how many gears.
- **Shift light** – you can set at which rpm every led couple will flash (you can insert 0 to disable the led or insert the same value to make them flash together).
- **Speed** – some parameters on the speed channel.
- **Alarms** – you can choose if and when to have an alarm led flash.
- **Welcome text** – the text that is shown when the **MXL** is switched on.

3.3.2 – EVO3



In this tab it is possible to set:

- **RPM** – some parameters on the rpm channel.
- **Gear sensor** – where is the channel sampled from and how many gears.
- **Reference speed** – some parameters on the speed channel.

3.4 – Display

This tab is shown only in **EVO3** configuration. It is used to state which is the display connected (choose **none** if you don't have a display) and to set all the display parameters. Available displays will be described from the smallest to the most complete one.

3.4.1 - TG dash

As in the following screenshot no parameter can be set for this display. You just have to tell the system you're using a TG dash but selecting it.



3.4.2 – M3 dash

In this tab it is possible to set:

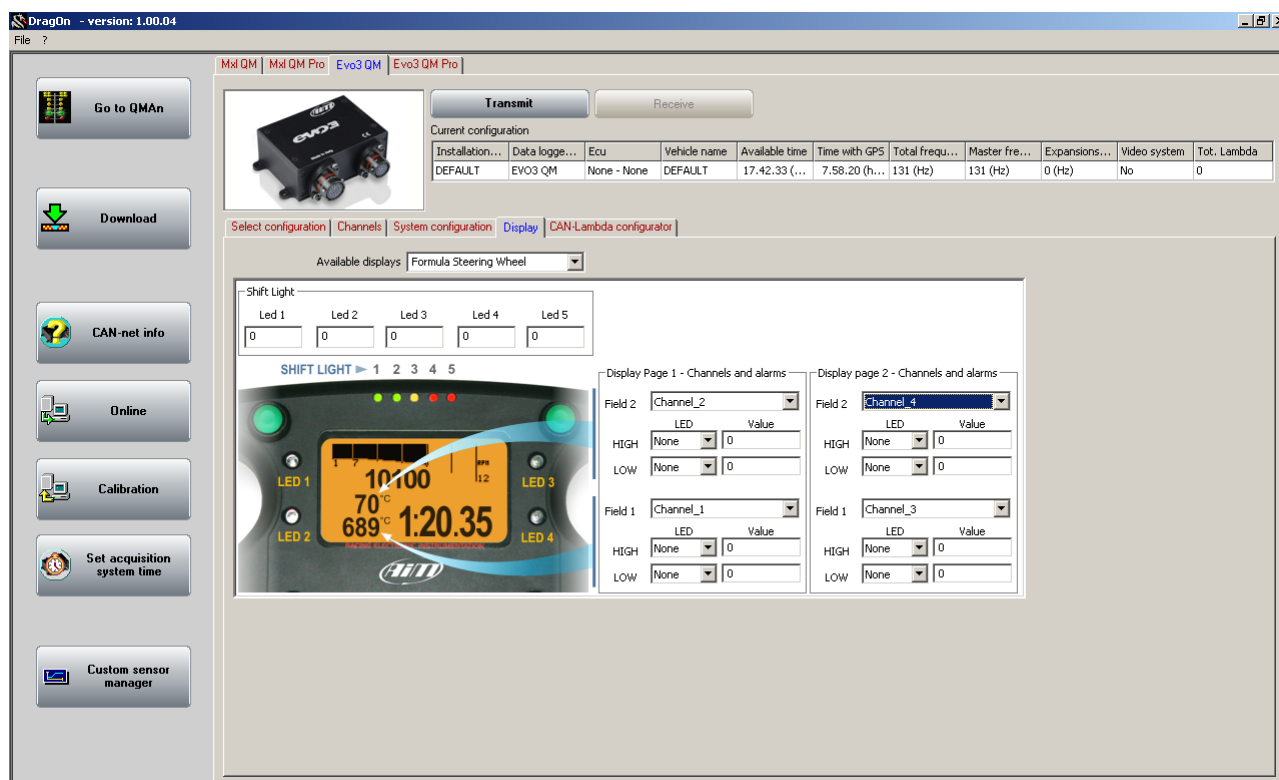
- **Shift light** – you can set at which rpm every led couple will flash (you can insert 0 to disable the led or insert the same value to make them flash together).
- **Alarms** – you can choose if and when to have an alarm led flash.



3.4.3 – Formula Steering Wheel

In this tab it is possible to set:

- **Shift light** – you can set at which rpm every led couple will flash (you can insert 0 to disable the led or insert the same value to make them flash together).
- **Alarms** – you can choose if and when to have an alarm led flash.



3.5 – CAN Lambda Configurator

As shown in the AIM Network picture, you can Program the logger to sample the signal of up to 12 lambdas using different **LCU-One** lambda controllers. For every information on **LCU-One** we kindly remind you to visit our website www.aim-sportline.com.

Some versions of the **LCU-One** can be used in connection to the AIM network and (via analog voltage output) to the ECU.

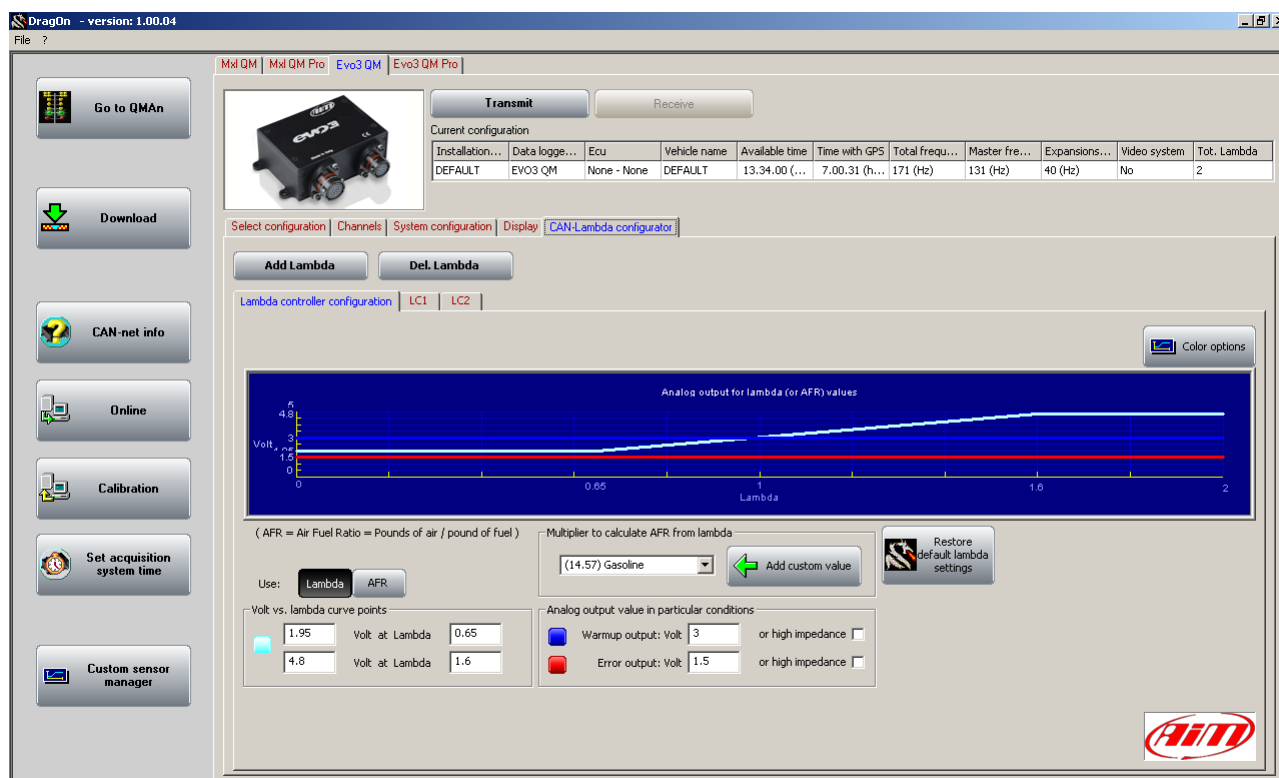
By default, with a brand new configuration, the following screenshot will appear, to remind you that the logger is Programmed not to communicate with any lambda.



You have two possibilities:

- **Add Lambda** – this will add a new sub tab control, shown in what follows, including a general purpose tab and a tab for every LCU-One connected
- **Delete Lambda** – this will decrease the sub tab control items

The following screenshot shows you the general purpose tab, named “Lambda controller configuration”.



The **LCU-One** correctly measures the lambda value (1 is Stoichiometric, below 1 mixture is rich, above 1 is lean), if you're used to look at the AFR value you'll need to enter the correct multiplier (different fuels have different multipliers).

To Program the LCU-One output (if you don't need that output just leave it as is by default) you just have to enter the two points for the linear conversion:

- 1.95V for lambda at 0.65
- 4.80V for lambda at 1.60

This means for example that with lambda half the way from 0.65 and 1.60, the output voltage will be half the way between 1.95V and 4.80V.

Many people using dyno benches Program it as follows:

- 0.65V for lambda at 0.65
- 1.60V for lambda at 1.60

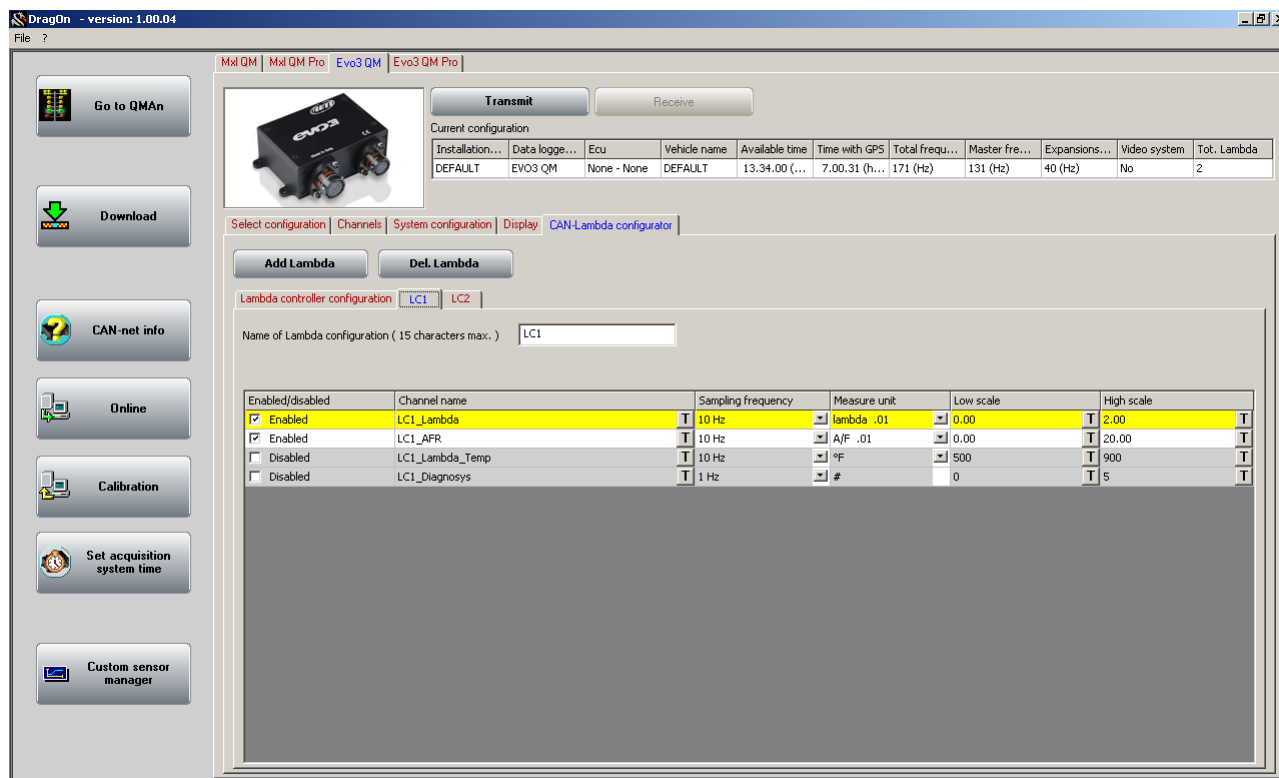
in order to measure the lambda value directly with a voltmeter.

You can define even the voltages for two LCU-One working conditions:

- **warmup**: this typically occurs while the engine has just been revved
- **error**: this typically occurs with something wrong in the wirings

Choosing “high impedance” no analog output os defined in these cases.

The following screenshot shows the **LCU-One** tab.



Every **LCU-One** you connect is seen as a set of four additional channels, you will normally choose one of the first two channels (lambda or AFR) and, in case you want to check the sensor usage, you will enable one or both the other two.

Lambda temperature is measured right where the sensing part of the Probe is, and can ensure it is Properly working within the correct range. Lambda diagnosis can be used to check if the measure is in error, but this doesn't happen if everything is OK in the wirings.

Chapter 4 – Race!

Now you're ready to race! After the burnout, before the staging phase, turn your data acquisition switch on. Your **MXL QM** will not start data recording while the data acquisition is switched off. When race's over, turn off the acquisition switch, connect the USB cable to your **MXL** and download data to your PC as explained in the following chapter. Then you will analyze your performance in detail through the QMA software.

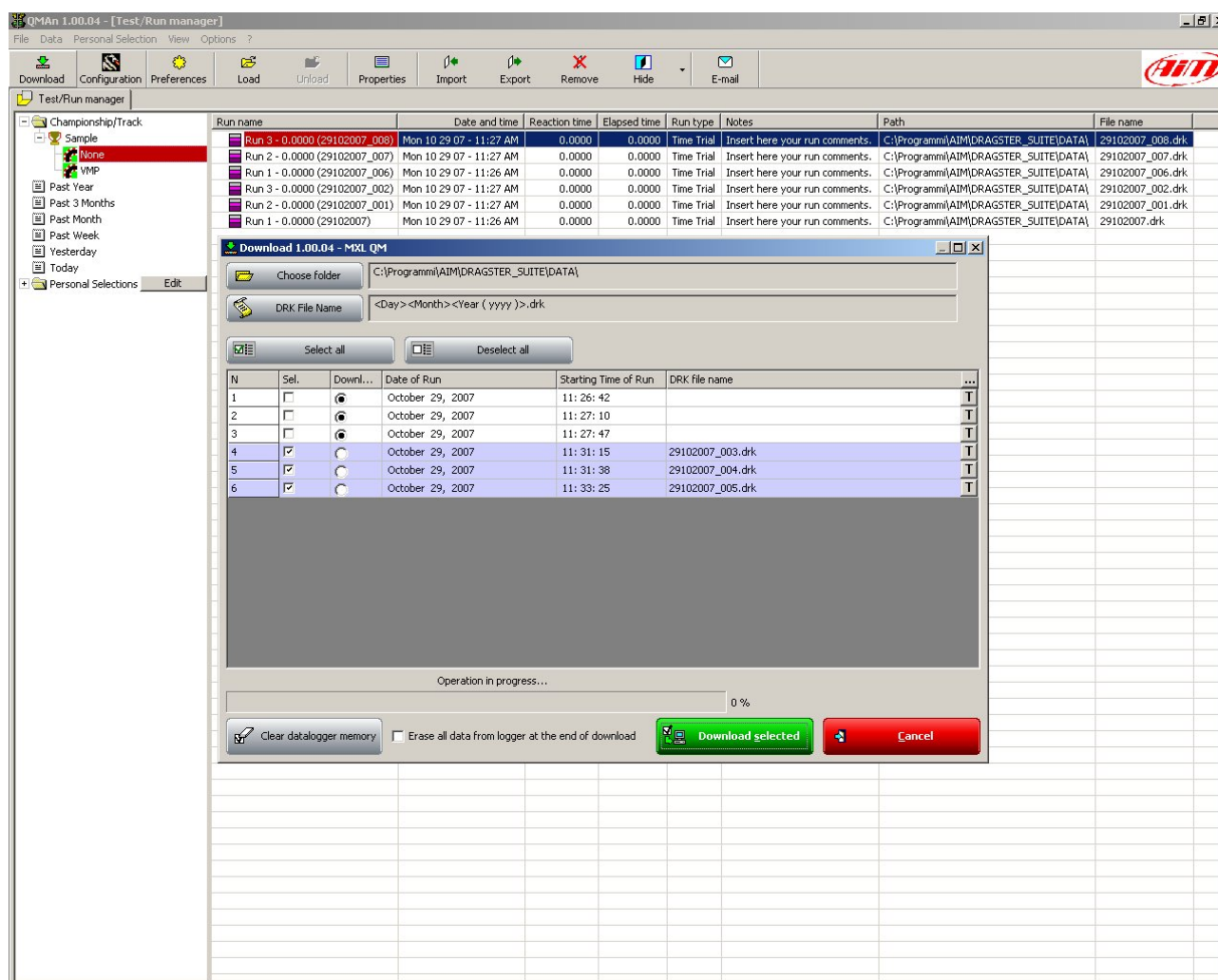
Chapter 5 – Download

The download Procedure will allow you to transfer acquired racing data to your PC for later analysis. Data download is possible by running both QMAN or DragOn software.

5.1 – QMAN

- Connect your **MXL QM** to your PC by using the USB cable. The **MXL** must be turned on.
- Run QMAN software
- Click the “Download” button on the toolbar.

The following window appears (download window will be described after):



Select the runs you want to download by flagging the related checkbox then click the “Download selected” button. The cyan row indicate that the run is new and hasn’t be downloaded yet.

5.2 – DragOn

- Connect your **MXL QM** to your PC by using the USB cable. The **MXL** must be turned on.
- Run **DragOn** software
- Click the “Download” button on the left bar.

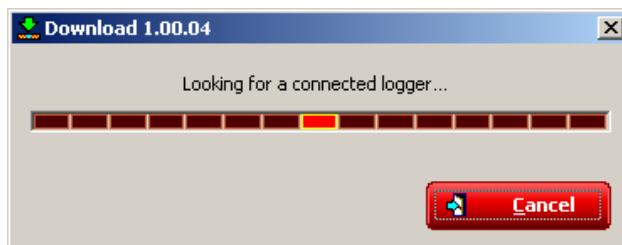
The following screen appears:



Select the runs you want to download by flagging the related checkbox then click the “Download selected” button. The cyan row indicate that the run is new and hasn’t be downloaded yet. After the download click “Go to QMA” on the top of the left bar to switch to analysis software.

5.2.1 – Download window

The download window could be preceded by the following small window stating that the software is waiting for a logger to be connected. As soon as one is connected the main download window will be Prompted.



Please kindly notice that the normal Procedure is:

- connect a logger;
- switch the logger on;
- perform download operation through the following window, in which you can see some command buttons and a list of runs available for download. Normally all the runs available are selected for download, you can choose to download only some of them and the command buttons named **Select All** and **Deselect All** are there to help you in this Process.



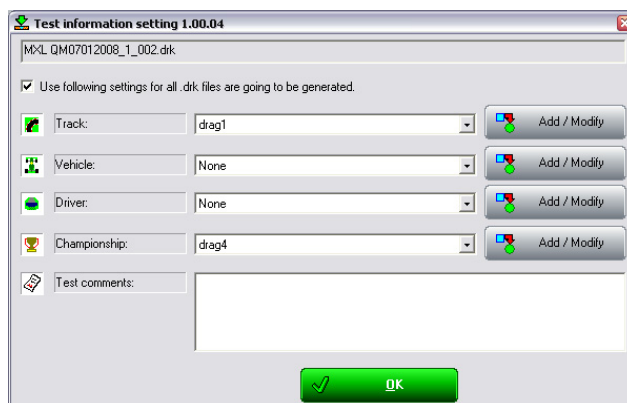
The choose folder button lets you customize the download file location.

The DRK File name button lets you tailor the naming of all the downloaded drk files.

If you flag the checkbox named “Erase all data from logger at the end of the download” the memory of the gauge will be completely emptied, so you will not flag it if you want to download from the same gauge on multiple PCs.

Download selected button will start the download Procedure while the *Cancel* button will exit this window without downloading anything.

For every drk file you're creating the following window is automatically Prompted. Here you can set the names of track, driver, championship and vehicle. After one download these names are automatically inserted by the software, recognizing the gauge that is connected to the PC, so you may decide to flag the checkbox "Use following settings for all the drk files that are going to be generated".

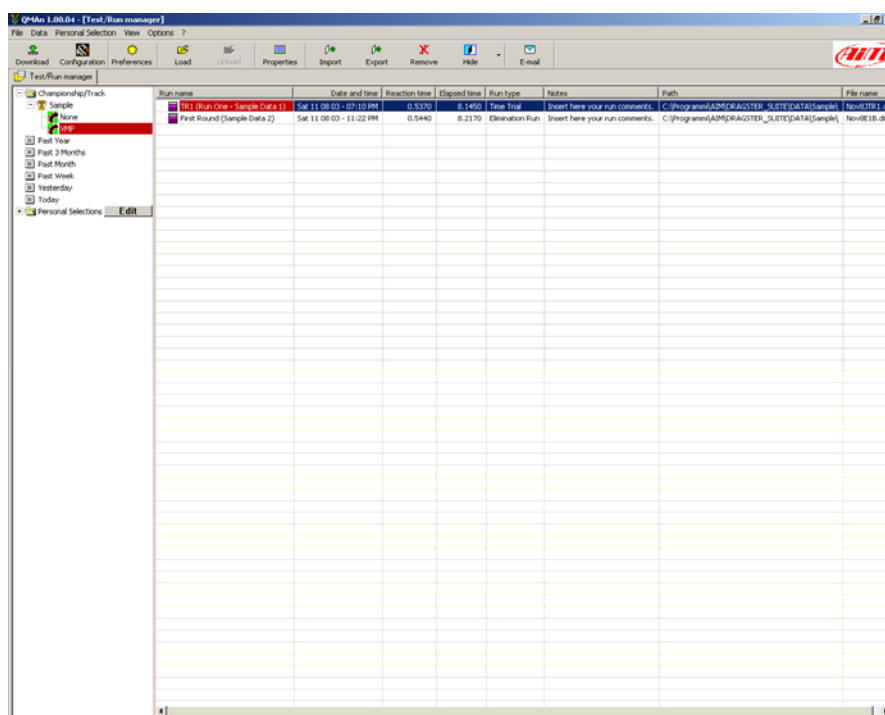


Chapter 6 – Analysis

Analysis is fundamental to set up your vehicle. You will analyze your racing data using the included **QMAN** software. This chapter describes how to use **QMAN** in order to obtain the maximum amount of information from the test file. This software has been designed focusing our attention on usability and ease of use, minimizing the number of clicks it takes for you to get the information you need, and get it quickly.

6.1 – Test/Run manager

Once you run **QMAN**, the following screenshot will appear. It features a toolbar, a left and a right part. The right part shows you the runs you already downloaded to your PC. The left part lets you refine the list of runs displayed on the right part.



Available commands are:

- **Download** – as already explained this opens the download window.
- **Configuration** – it runs the DragOn software.
- **Preferences** – opens a window in which software preferences can be set.
- **Load** – loads the selected run/s for analysis (it is enabled only if non of the selected runs are loaded).
- **Unload** – unloads the selected runs (it is enabled only if all the selected runs are already loaded).
- **Properties** – opens a window that lets you modify some run file Properties.
- **Import** – lets you add some run files to your run database from an external file.
- **Export** – lets you export some run files from your run database (e. with the aim to move them to another PC).
- **Remove** – removes a run from the database.
- **Hide** – hides a run from the database.
- **E-Mail** – lets you send some runs by e-mail.

Because of the large number of runs that you will acquire during your racing time, we give you the possibility to choose and group runs following your preferred and customizable Criteria or Selection (Time, Racer, Track, Championship, Vehicle).

As shown in the previous screenshot, the “Test/Run manager” layer is divided into 2 separate parts: on the left it is shown the track name (left click on the track name to select the desired one) while on the right there’s a list of all the runs which belong to that track.

In order to load a run for analysis, you may

- double click on the desired one;
- select one run and click the “LOAD” button in the upper toolbar;
- select the desired run, right click and choose the “LOAD” command in the context menu.

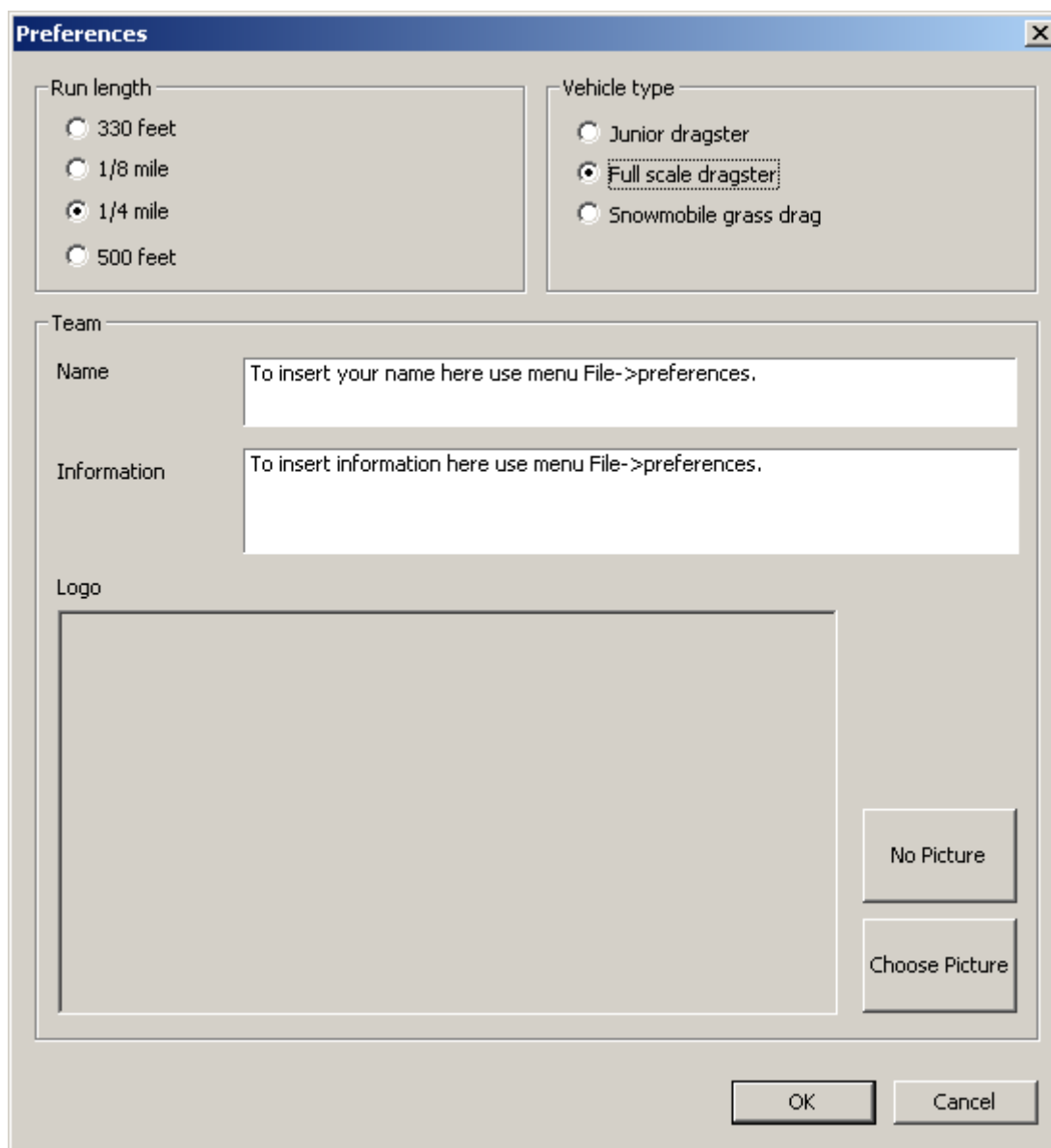
QMAN has been designed to share data easily. If you need to share test or run file data, you may **send the file via e-mail** by just clicking one button. Go to “Test/Run Manager” layer and select the test you wish to send among the available one. The selected file will become red-highlighted.

Now, before sending the DRK file, please ensure that your PC is connected to Internet and, then, press button “E-mail” (located inside the button toolbar). By default, the recipient’s address will be an AIM email address, just change it with the recipient you want send .drk files to.

In case you need assistance from AIM, just select the “Send files by e-mail to AIM” option. We will receive just the test file and logger information. No personal data will be sent to us. Please remember to write in the e-mail text the reason you’re sending data for, we’ll reply you as soon as possible.

NOTE: it is reminded that you may not send a file if it is loaded. In this case, please unload it and, then, send it via e-mail.

If you want **set software preferences**, please close all open tests and select "Preferences" from the top toolbar. The following picture will appear.



The Preferences dialog box is titled "Preferences" and contains several sections for configuring the software. It includes a "Run length" section with four radio button options: 330 feet, 1/8 mile, 1/4 mile (selected), and 500 feet. A "Vehicle type" section has three radio button options: Junior dragster, Full scale dragster (selected), and Snowmobile grass drag. The "Team" section contains three text input fields: "Name" (with placeholder text "To insert your name here use menu File->preferences."), "Information" (with placeholder text "To insert information here use menu File->preferences."), and "Logo" (a large empty box). To the right of the "Logo" box are two buttons: "No Picture" and "Choose Picture". At the bottom right of the dialog are "OK" and "Cancel" buttons.

Please choose the correct **run length** and **vehicle type**, as many features in the software were specifically developed for different lengths and vehicles.

You can also have a slight customization of software printouts inserting your name, some team information and your team logo.

6.2 - Analysis View

Once a run has been loaded, it will be Prompted the “Analysis View” window, shown in the screenshots that follow along this chapter. There are up to 8 Analysis View available, any of them is customizable independently from others, hence enabling you to have different analysis templates always available. The default name for each view is “Time View”, it can be changed through the plot settings command, as explained later.

Again the view has a toolbar, a left part and a right part, showing new information, both the left and the right part are divided in sub windows, described in what follows.

The left part of the toolbar is the same already described. Available commands in this view are:

- **Channels** – to modify run channels Properties.
- **Settings** – to modify plot settings Properties.
- **Plot type** – to choose which kind of plot you want to display.
- **Zoom In** – to move the analysis to a shorter time window.
- **Zoom Out** – to move the analysis to a longer time window.
- **Displacement** – to change channels displacement on the plot.
- **Prediction** – to plot, when available, an ET prediction, useful for bracket racing.

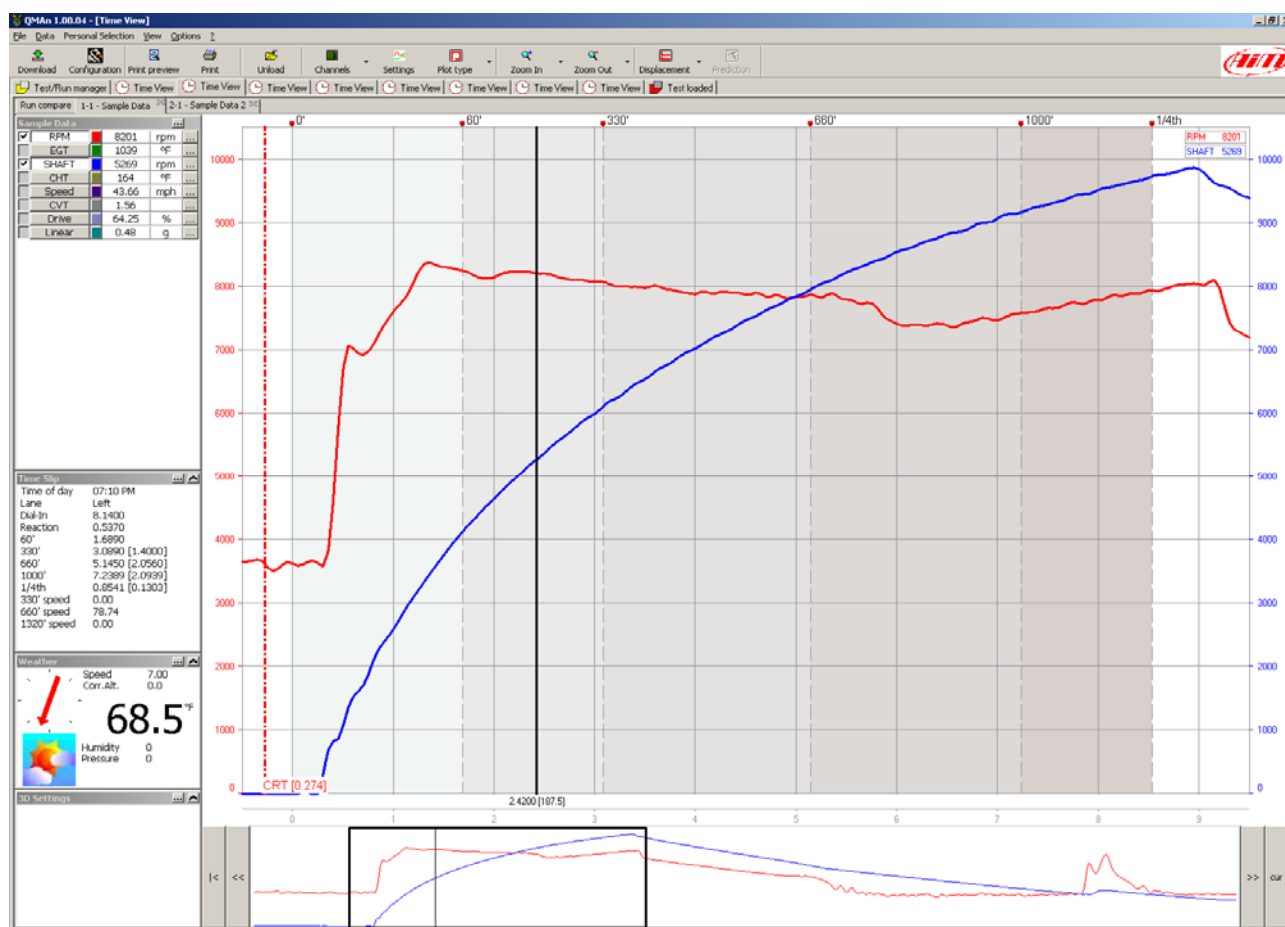
Three different types of plot graph are available: Time, XY and Histogram; clicking on the Plot type toolbar button you can switch between each other.

We'll be immediately explaining the Time Plot graph, to follow later with XY and Histogram. What is similar in the three graphs will be explained only for the Time Plot one. As a matter of fact the left part, including the channels list, the time slip, the weather information and the 3D settings is in common between the three graphs. The same can be said on the bottom part with the run history.

6.2.1 – Time Plot

The “Time plot” feature allows the user to plot a logged channel versus time. Left click inside the graph to show a vertical cursor. Along the horizontal axes it will be shown the time and distance (calculated from the start line) value corresponding to that position. At the top right part of the graph the value tags of the shown measures are displayed. The background of the plot is greyscale coloured in order to evidence the time slip times.

At the top of the window it is possible to see a tab control with the leftmost tab named “Run Compare”, and a tab for every loaded run. Selecting any runs tab the view will show only the data of that particular run, selecting the Run Compare tab you’ll be able to see at the same time the data of up to 2 runs.

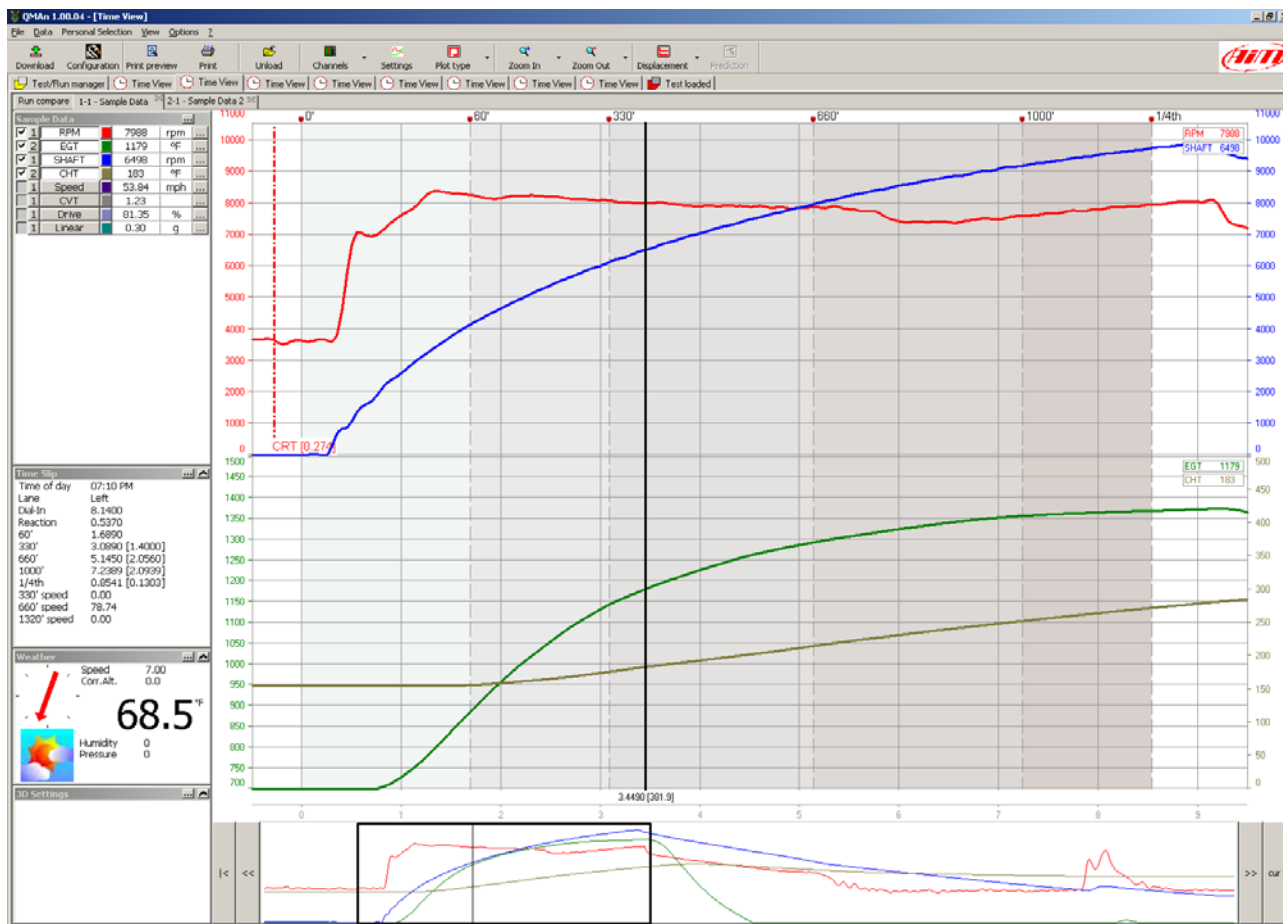


The user may choose the channel to be plot on the graph left-clicking on the channel name inside the “channels list” window (located in the upper left corner of the “Time plot” window).

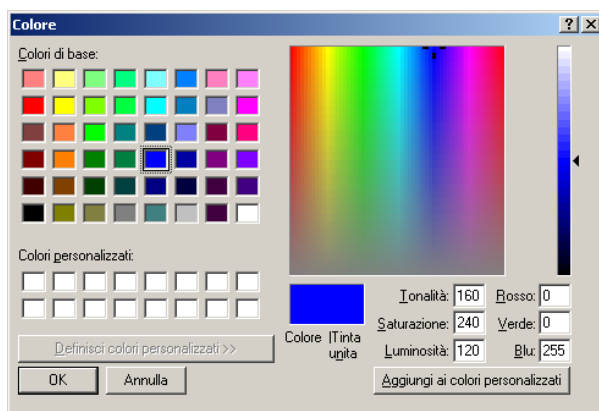
Moreover, the measurements displayed inside the “available measurements” toolbar are linked to the cursor movement, showing the current value corresponding to the selected track position.

In order to plot the scale together with the input channel, please enable the checkbox aside the desired channel inside the “channels list” toolbar.

Clicking on the *Displacement* toolbar button it is possible to choose how to display the channels into the plot, you'll use the small button with numbers in the channels list window to decide where to place every channels. In the following screenshot an example in which we placed RPM and shaft speed at the top and two temperatures at the bottom.



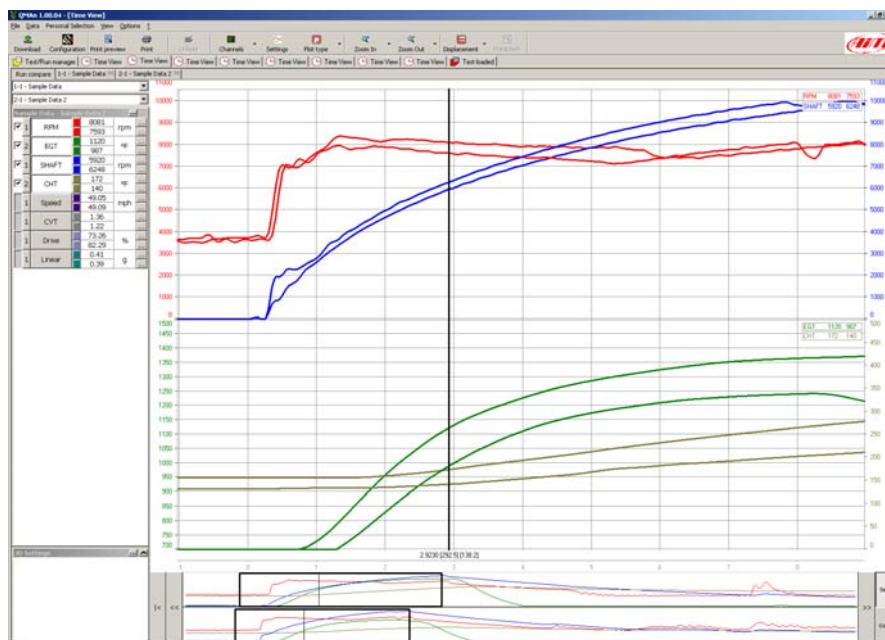
Clicking the small coloured button close to every channel name it is possible to choose the plot colour of the channels itself. The click on the colour button Prompts the following window.



In the lower part of the “Time plot” window it is displayed the “Run toolbar”, which is a graph showing the complete time history of the loaded run.

User may drag and drop the black square drawn inside the “Run toolbar”: the graph displayed inside the “Time plot” window will move together with the dragged window. The black square evidences what shown in detail in the upper part of the plot.

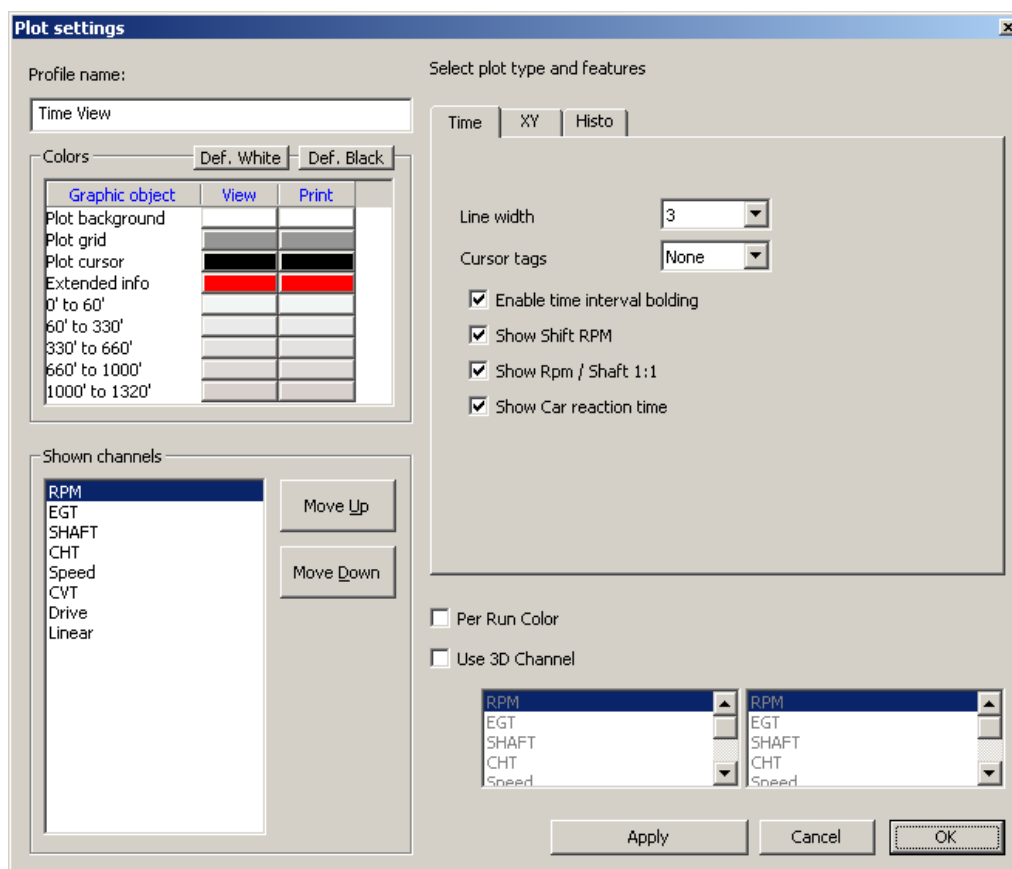
When in Run Compare mode the run history bar displays two separate black squares, one for every run. Users normally drag them together, as stated by the *Tie* command check button in the right part of the run history. Unchecking the Tie button you’ll be able to fine align runs that eventually are not correctly recognized by the software.



The width of the data window can be modified, you may click the 2 buttons located inside the buttons toolbar. QMAN allows the user to choose among 7 predefined zooms: 2 seconds window, 4, 6, 8, 10, 14 and 20 seconds. For instance, if you were looking a graph inside a 10 seconds window and you click the “Zoom in” button, the “Time plot” will change to an 8-seconds window.

You can zoom either using the up-down arrows buttons on your keyboard or through the mouse wheel when the mouse cursor is over the plot.

Plot settings can be modified through the **Settings** command in the toolbar. The following window is Prompted. Kindly notice that there are parts of this window that are different for XY graphs and Histogram graphs, they will be explained later.



It is possible to set the view name, defaulted to “Time View”.

It is possible to modify the colours of the graph objects that are not bound to channels, and it is given the possibility to go back to defaults, with black or white background. Different backgrounds are managed for printing and for view, as usually printouts have white background.

The channels shown in the channels list already described can be sorted, this is a useful feature when a huge number of recorded channels (typical of several applications of the **EVO3** or **MXL**) are logged for every run. This way you’ll be able to use different views to plot different information, always ready for a quick interpretation of data.

Line width settings refer to channels traces.

Cursor tags refers to the cursor drawing around the line plotted for every channel.

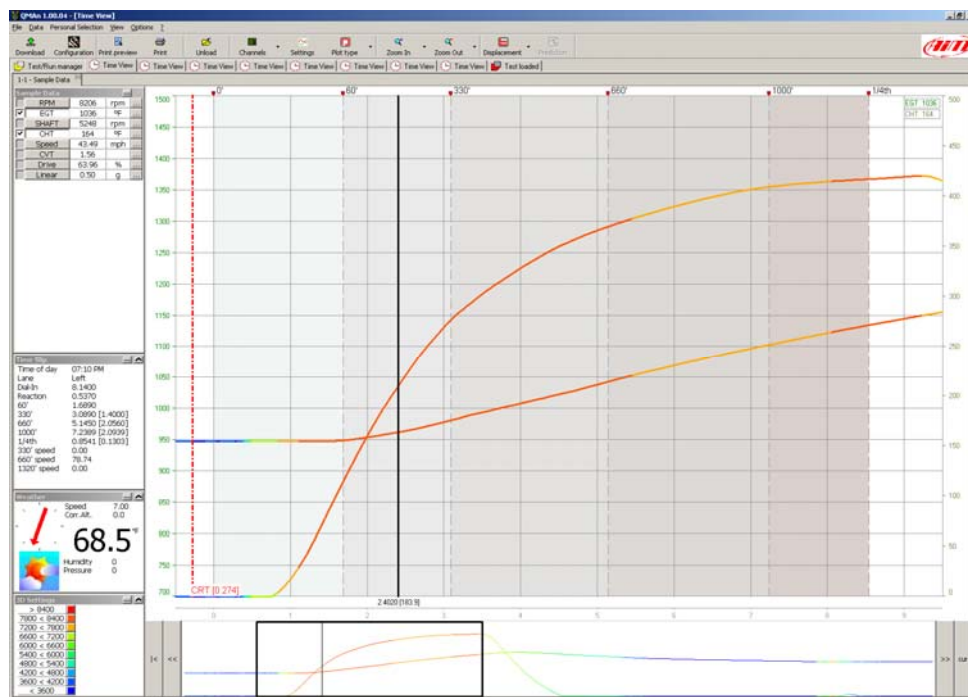
Enable time interval bolding refers to the gray scaled background of the time plot.

Show shift RPM is useful while displaying some Junior Drasters data, the same for Show RPM / Shaft 1:1.

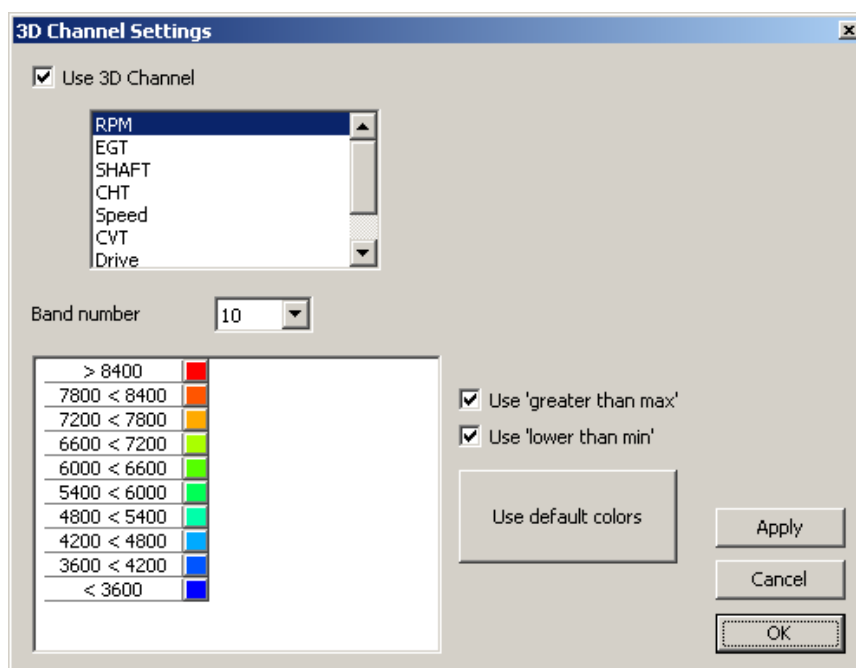
Show Car reaction time enables the drawing on the time plot of a vertical dashed red line evidencing it.

Per Run Colour is useful when comparing two runs, all the channels pertaining to a run will have the same colour, making it easy to identify them.

The Use 3D channel lets you plot channels' lines using a colour that is not the colour chosen for that channel, but instead a colour bound to a third channel value through a colour scale shown in the bottom left part of the view.



Double click the 3D colour scale to show its settings window.

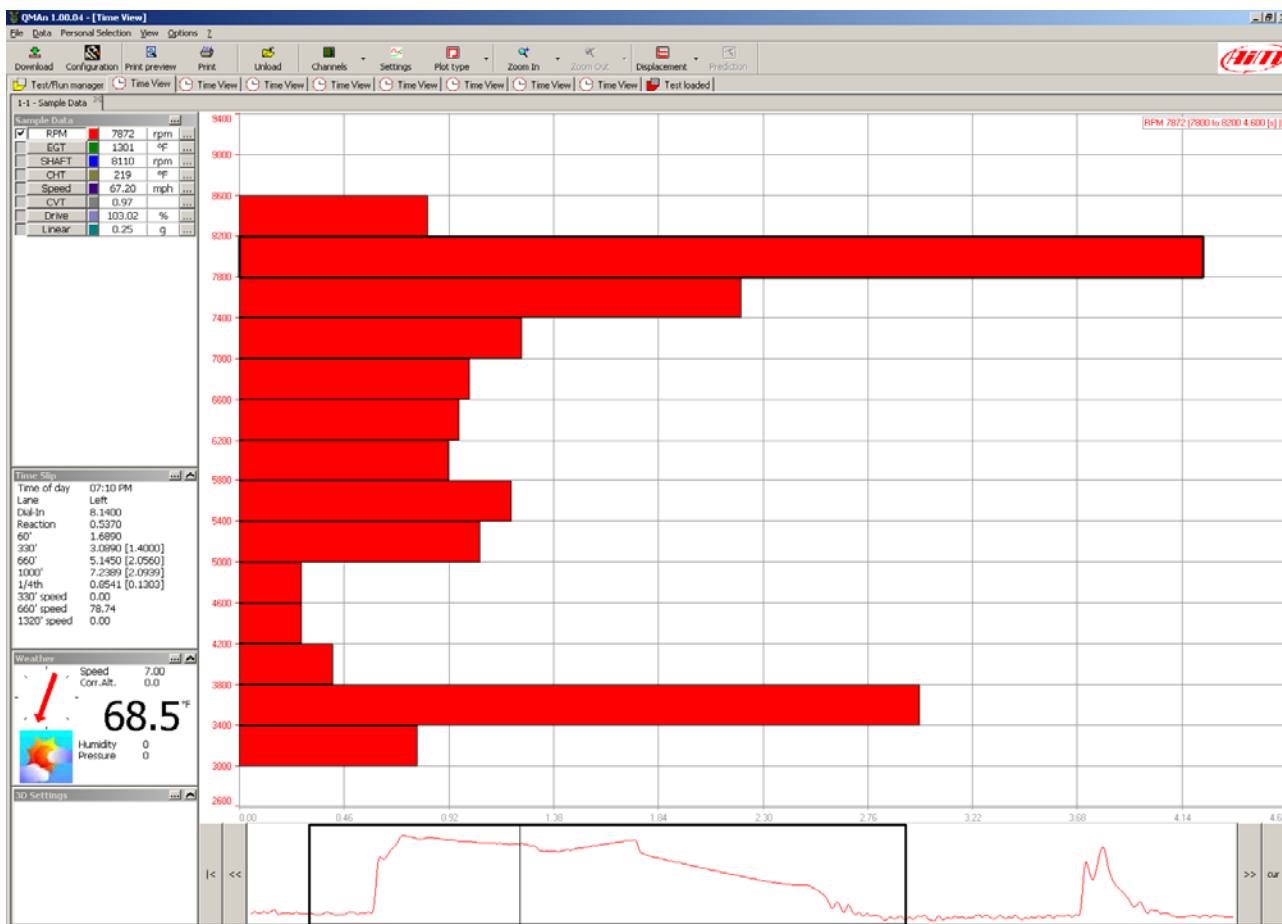


Through this window it is possible to set the bands number and the bands thresholds.

6.2.2 – Histogram

While showing a histogram plot you'll be able to see how long a channel remains within a certain band. In the following screenshot the RPM histogram, that lets you understand which are the most used RPM in the run, allowing you a better engine tuning.

Kindly notice that while moving the mouse cursors over a bar on the plot a tag will show you the value of the bar.



Plot settings

Profile name:

Colors: **Def. White** **Def. Black**

Graphic object	View	Print
Plot background		
Plot grid		
Plot cursor		
Extended info		
0' to 60'		
60' to 330'		
330' to 660'		
660' to 1000'		
1000' to 1320'		

Shown channels:

- RPM
- EGT
- SHAFT
- CHT
- Speed
- CVT
- Drive
- Linear

Select plot type and features: **Time** **XY** **Histo**

Histogram type: ☒ Time ☐ Percentage

Beans number: 6, 7, 8, 9, 10, 11, 12, 13, 14, **15**, 16

☐ Per Run Color ☐ Use 3D Channel

RPM, EGT, SHAFT, CHT, Speed

Chassis Log 014 - Time View

Download Configuration Print preview Print Unload Channels Settings Plot type Zoom In Zoom Out Displacement Prediction

Test Run manager Time View Time View Time View Time View Time View Time View Time View Time View Test loaded

1-1 - Sample Data

Parameter	Unit	Value
SP4	rpm	7072
EGT	°F	1301
Shaft	rpm	6110
OHT	°F	219
Speed	mph	67.30
CVT	%	0.97
Drive	%	103.02
Linear	g	0.25

Time View

Time of day: 07:10 PM
 Lane: Left
 Out-In: 8.1400
 Reaction: 0.5370
 60": 1.6890
 300": 3.0890 [1.4000]
 660": 5.1450 [2.0960]
 1000": 7.2369 [2.0099]
 1/4th: 0.8541 [0.1303]
 300" speed: 0.00
 660" speed: 78.74
 1320" speed: 0.00

Weather

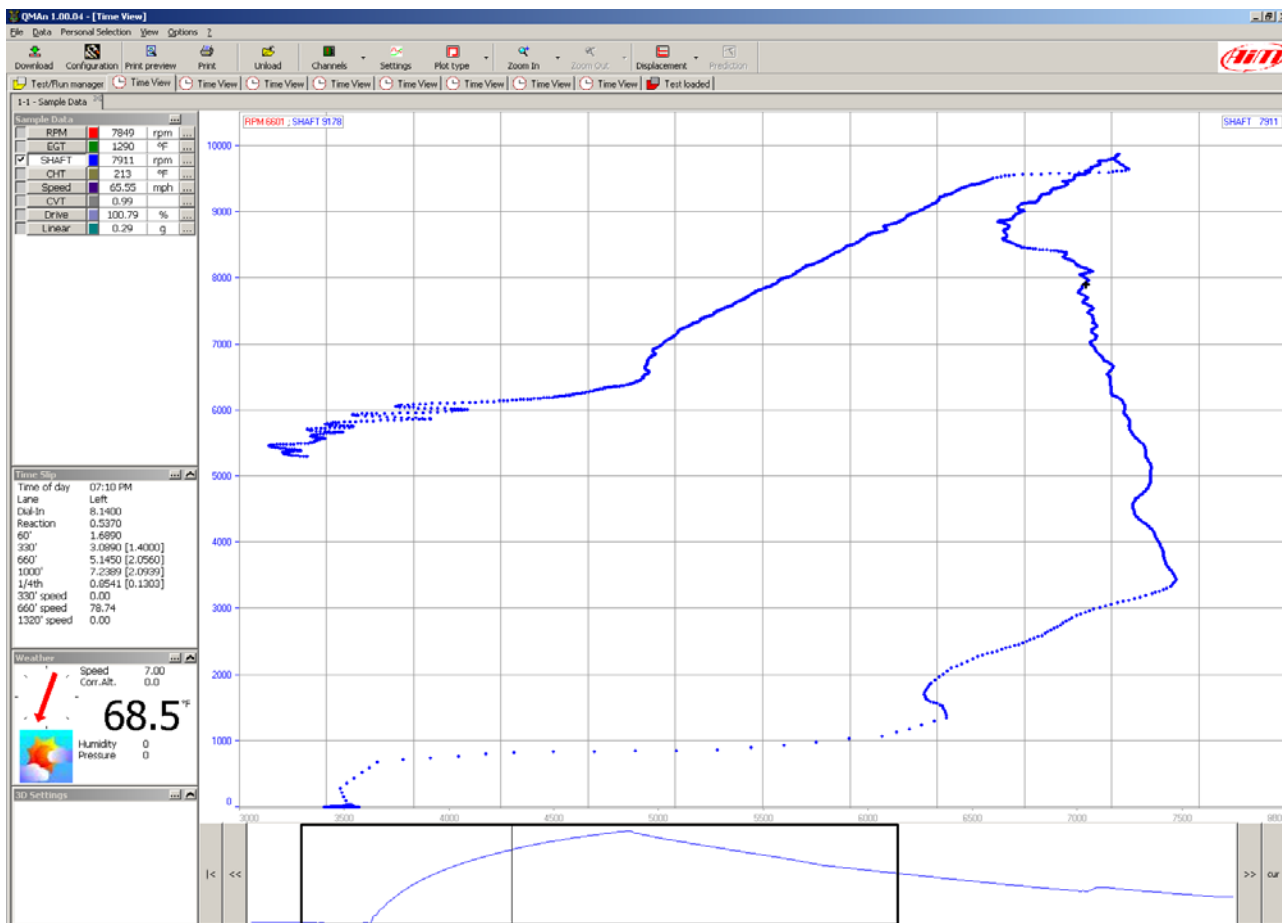
Speed: 7.00
 Cor. Alt.: 0.0
68.5°F
 Humidity: 0
 Pressure: 0

3D Settings

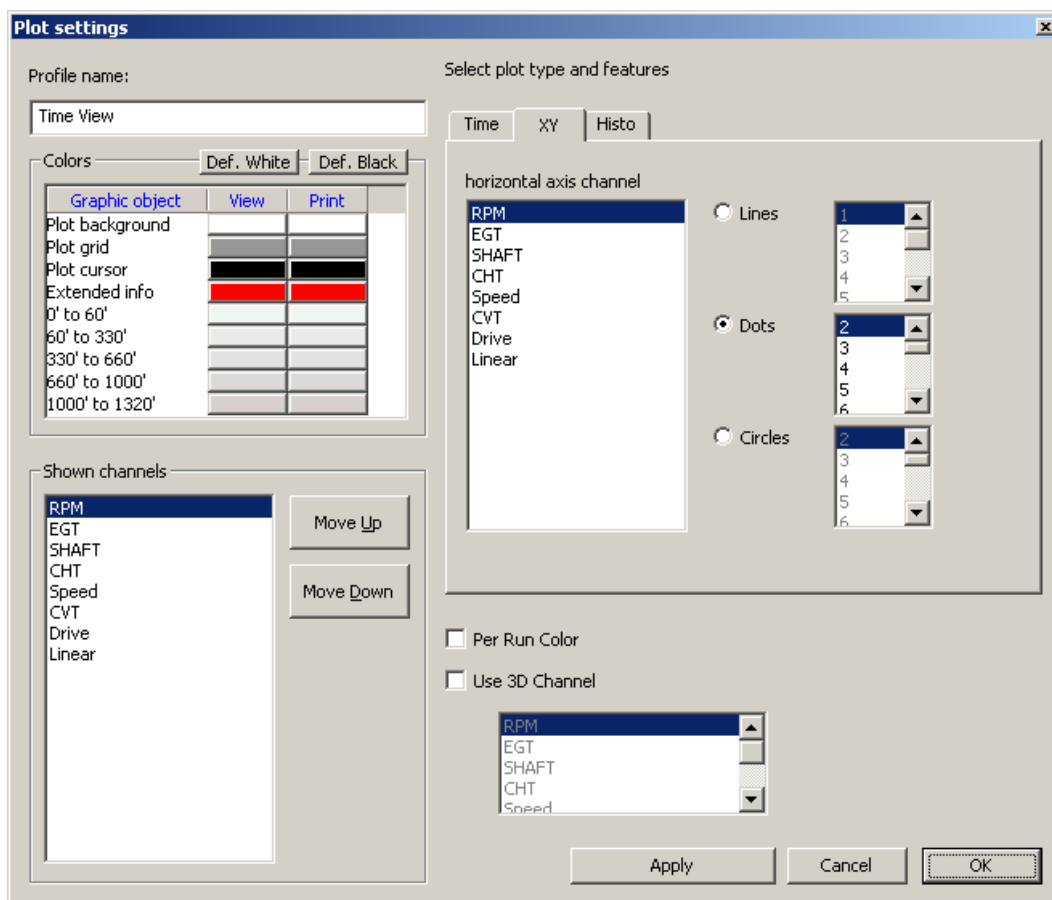
9450 < 9450
 7750 < 8450
 6300 < 7250
 5250 < 6300
 4200 < 5250
 3150 < 4200
 2100 < 3150
 1050 < 2100
 0

6.2.3 – XY Plot

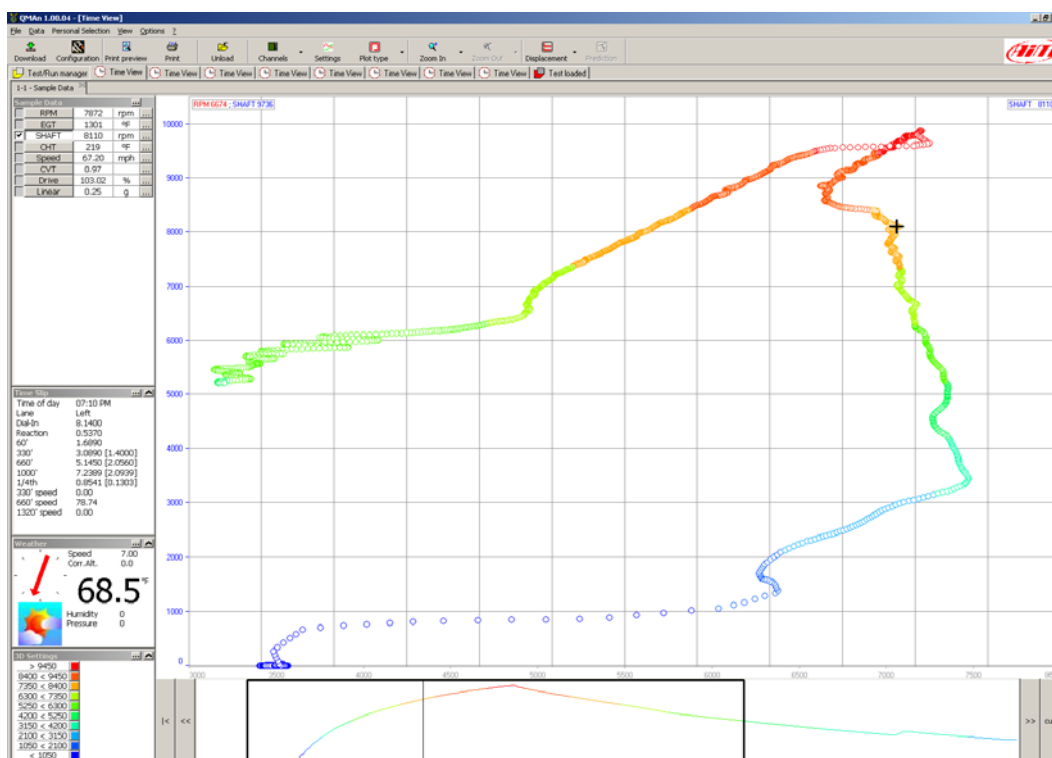
The XY plot or scatter plot shows the traces of the enabled channels versus one selected X channel. If you check the *Cursor* button in the run history bar you can move the cursor within the run history bar and see what happens inside the XY plot. In this “cursor movement” mode the drag and drop functionality of the time window doesn’t work: just uncheck the cursor button and the drag and drop mode will be back.



The next screenshot shows you that the settable parameters of the XY plot are the horizontal axis channel and the drawing mode: lines, dots or circles (and their dimensions).

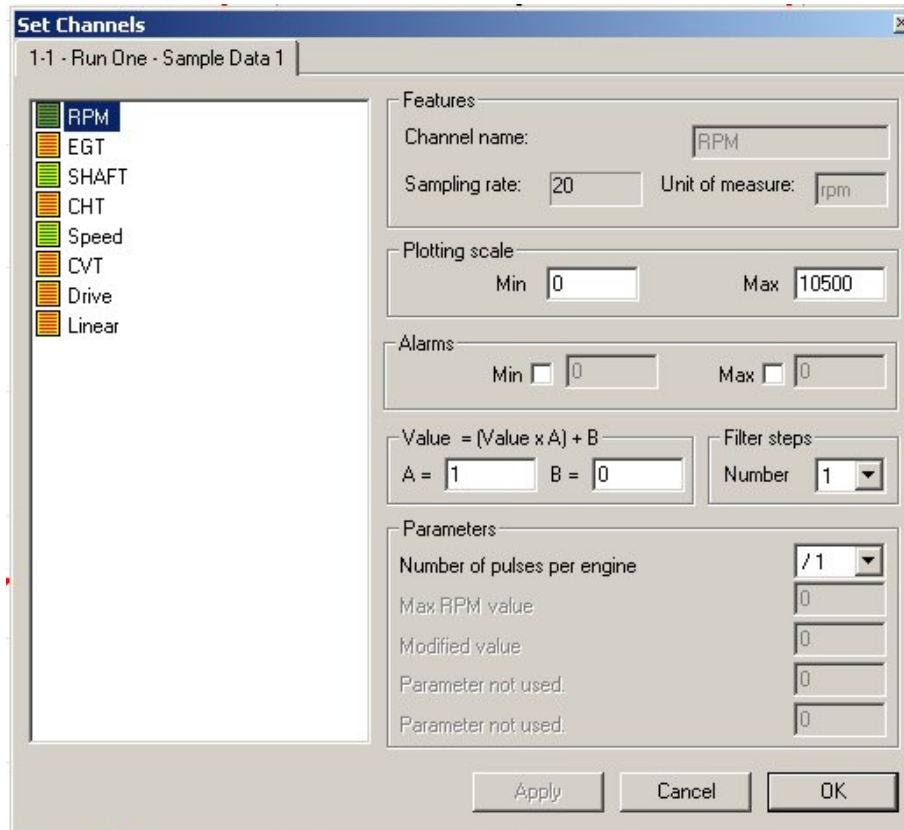


The XY plot lets you show a 3D channel as well as the other two plots.



6.2.4 – C hannel info

There are a number of parameters that can be modified for each channel, you may right click on the channel name inside the “Available measurements” toolbar or click the “Channels” button inside the buttons toolbar. The “Set Channels” window (shown here) will be displayed.



The "Set Channels" dialog box is shown with the following settings:

- Channel name:** RPM
- Sampling rate:** 20
- Unit of measure:** rpm
- Plotting scale:** Min 0, Max 10500
- Alarms:** Min ☐ 0, Max ☐ 0
- Value = (Value x A) + B:** A = 1, B = 0
- Filter steps:** Number 1
- Parameters:**
 - Number of pulses per engine: / 1
 - Max RPM value: 0
 - Modified value: 0
 - Parameter not used: 0
 - Parameter not used: 0

Buttons: Apply, Cancel, OK

If you change the plotting scale you'll generate a redraw of the graphs as soon as you close this settings window. Changing the plotting scale value will allow you to modify the graph's higher and lower limit.

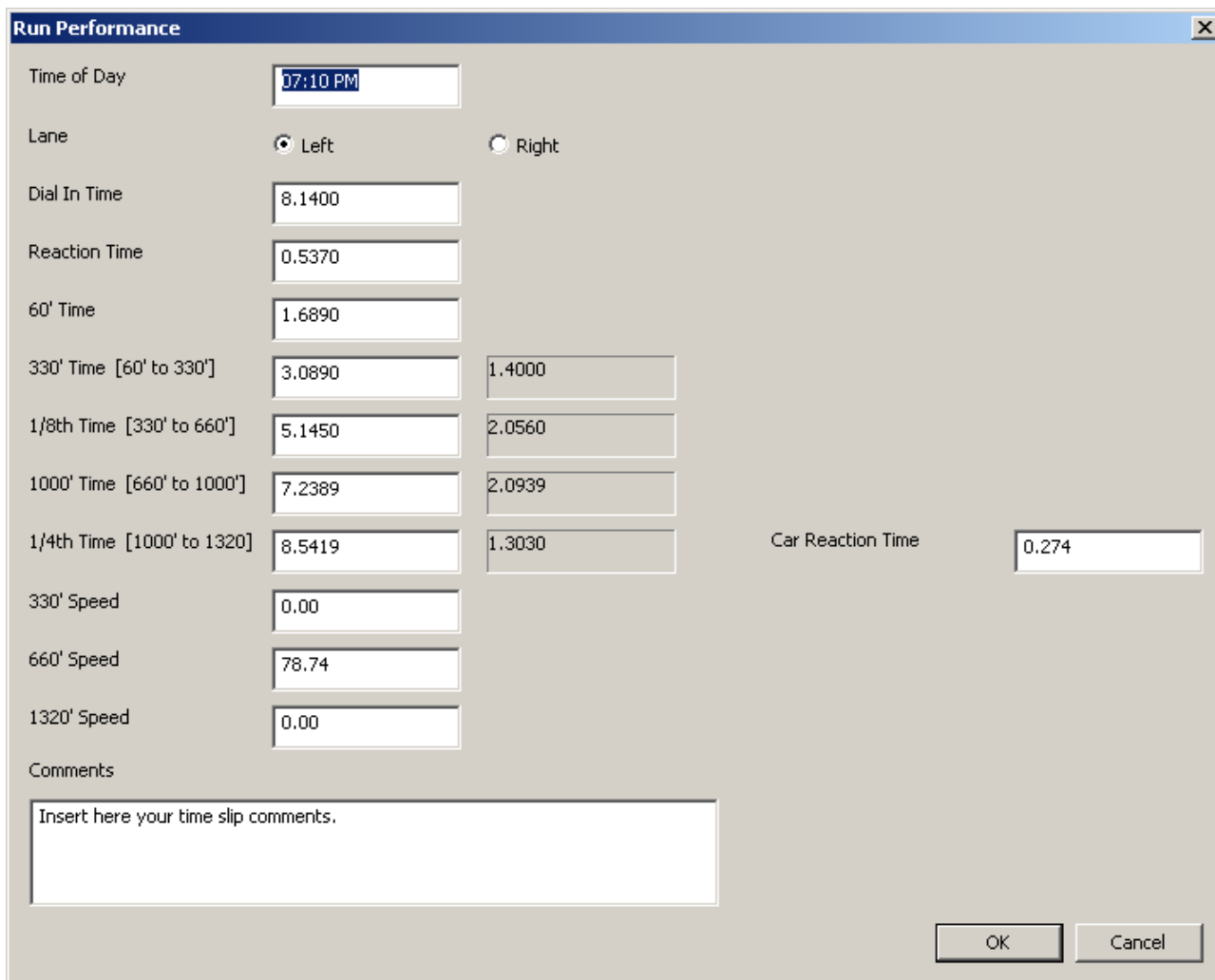
If you enable an alarm and Properly set its threshold you'll see a red coloured background for the channel values (only in case the alarm is hit) in the channels list window.

The other parameters affect the channel value and behave differently sensor by sensor, normally nothing has to be changed in these values.

6.2.5 – How to set the time slip info

Once the time slip have been handed to the racer. QMAN has been designed to allow you to insert useful data (reaction time, 60' – 330' – 1/8th – 1000' and 1/4th time, 330' – 660' and 1320' speed) inside the test file in order to recall them when needed.

In case you selected a shorter run length in software preferences (already described) the higher distances settings (say 1320 time and speed, ...) will not be shown.



The 'Run Performance' dialog box contains the following fields and controls:

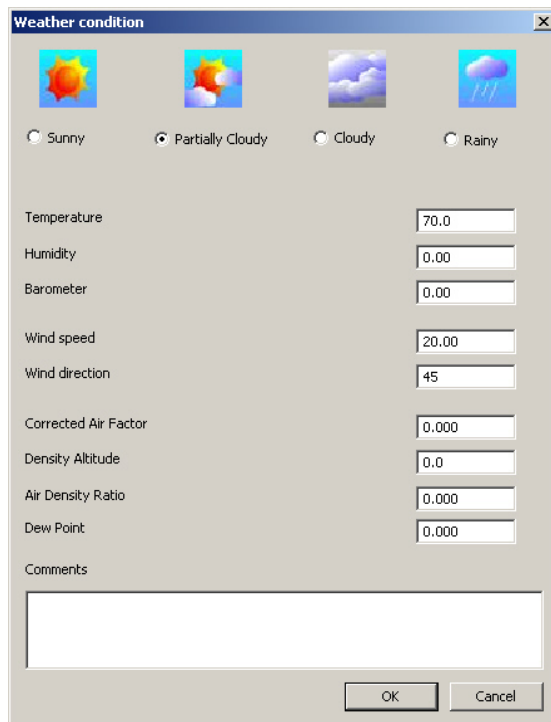
- Time of Day:** A text box containing '07:10 PM'.
- Lane:** Two radio buttons, 'Left' (selected) and 'Right'.
- Dial In Time:** A text box containing '8.1400'.
- Reaction Time:** A text box containing '0.5370'.
- 60' Time:** A text box containing '1.6890'.
- 330' Time [60' to 330']:** Two text boxes, the first containing '3.0890' and the second containing '1.4000'.
- 1/8th Time [330' to 660']:** Two text boxes, the first containing '5.1450' and the second containing '2.0560'.
- 1000' Time [660' to 1000']:** Two text boxes, the first containing '7.2389' and the second containing '2.0939'.
- 1/4th Time [1000' to 1320']:** Two text boxes, the first containing '8.5419' and the second containing '1.3030'.
- Car Reaction Time:** A text box containing '0.274'.
- 330' Speed:** A text box containing '0.00'.
- 660' Speed:** A text box containing '78.74'.
- 1320' Speed:** A text box containing '0.00'.
- Comments:** A large text area with the placeholder text 'Insert here your time slip comments.'
- Buttons:** 'OK' and 'Cancel' buttons at the bottom right.

These settings affect the gray scaled backgrounds of the time plot.

6.2.6 – How to set weather station data

The user is allowed to set the weather conditions, in order to be able to correlate the test performances (reaction time, linear acceleration, engine's setup) even to the atmospheric conditions.

If you wish to set weather parameters, please press the “...” button aside of the “Weather” toolbar (left column) or double click the Weather window.



The "Weather condition" dialog box is used to configure weather parameters. It features four weather icons at the top: Sunny, Partially Cloudy (selected), Cloudy, and Rainy. Below the icons are radio buttons for each condition. The main section contains input fields for various parameters: Temperature (70.0), Humidity (0.00), Barometer (0.00), Wind speed (20.00), Wind direction (45), Corrected Air Factor (0.000), Density Altitude (0.0), Air Density Ratio (0.000), and Dew Point (0.000). A large text area for "Comments" is located at the bottom, followed by "OK" and "Cancel" buttons.

Parameter	Value
Temperature	70.0
Humidity	0.00
Barometer	0.00
Wind speed	20.00
Wind direction	45
Corrected Air Factor	0.000
Density Altitude	0.0
Air Density Ratio	0.000
Dew Point	0.000

6.3 – Test Loaded View

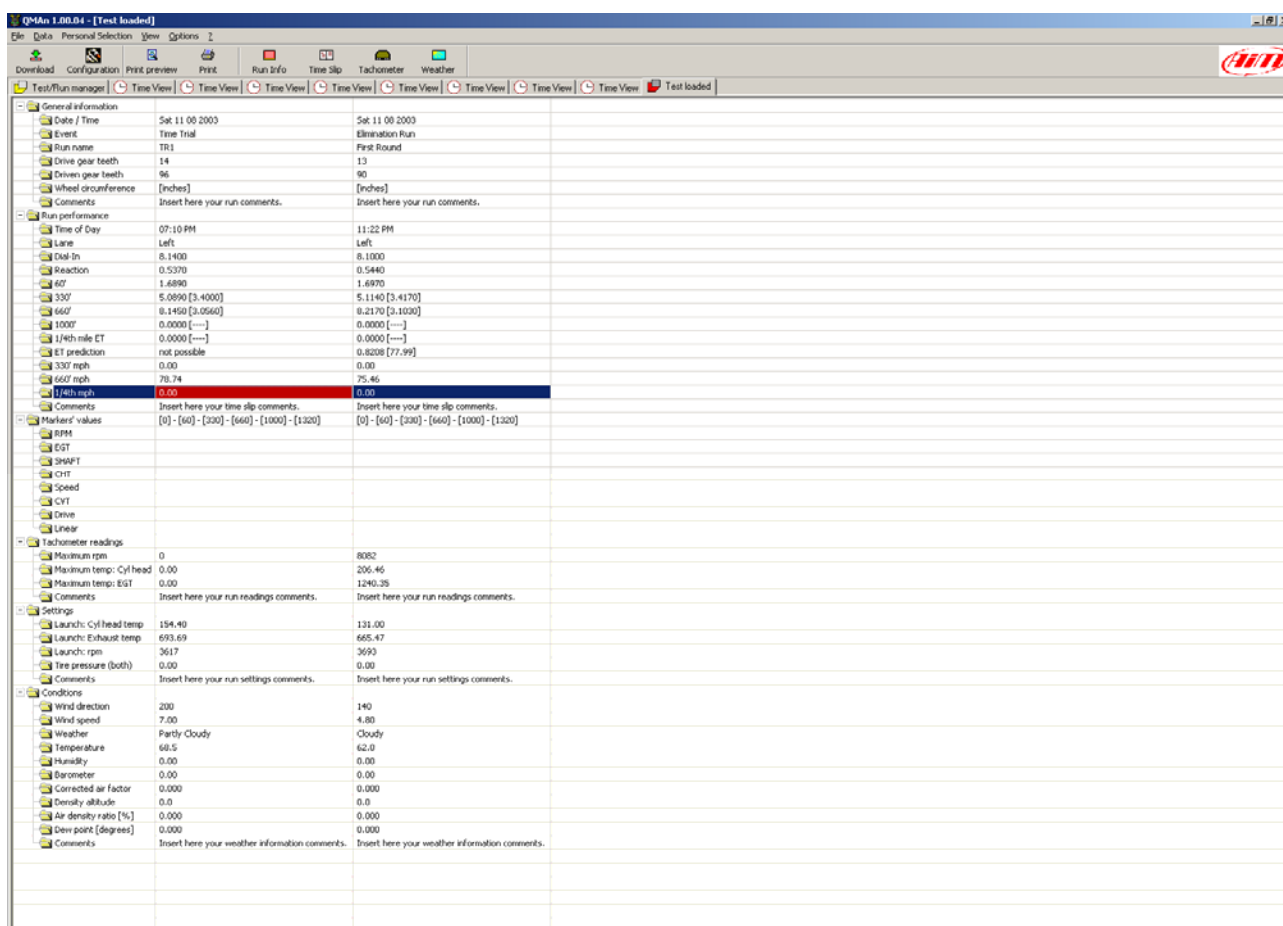
This view shows a report form of all the information bound to every run loaded for analysis. If you red-highlight a line of a run you can click on one of the toolbar buttons to open the settings window already shown and that will be rapidly summarized in the following lines.

The view has a toolbar and a bottom part containing the report itself.

The left part of the toolbar is the same already described. Available commands in this view are:

- **Run Info** – to modify run settings.
- **Time Slip** – to modify time slip settings.
- **Tachometer** – to modify tachometer settings.
- **Weather** – to modify weather settings.

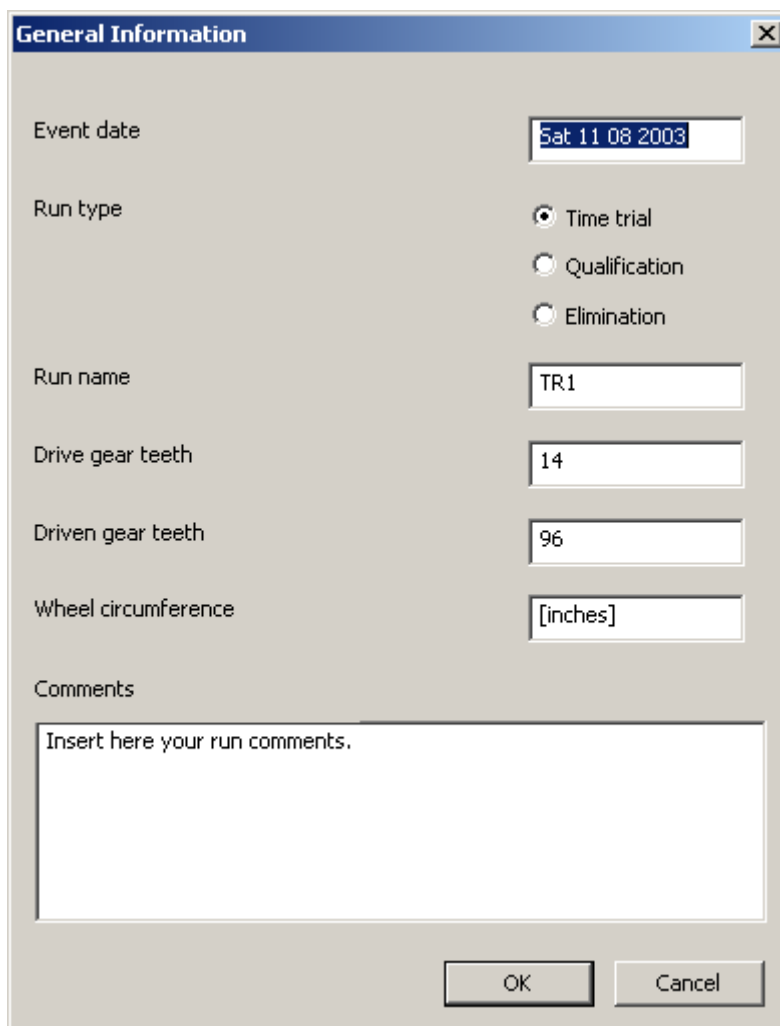
The reports easily self describes: the first column includes the descriptions, then you'll see one column for each run you load.



General information		Sat 11 00 2003	Sat 11 00 2003
Date / Time	Time Trial	Elimination Run	
Event	TR1	First Round	
Run name			
Drive gear teeth	14	13	
Driven gear teeth	96	90	
Wheel circumference	[inches]	[inches]	
Comments	Insert here your run comments.		
Run performance			
Time of Day	07:10 PM	11:22 PM	
Lane	Left	Left	
Dial-In	8.1400	8.1000	
Reaction	0.5370	0.5440	
60'	1.6890	1.6970	
330'	5.0890 [3.4000]	5.1140 [3.4170]	
660'	8.1450 [3.0560]	8.2170 [3.1030]	
1000'	0.0000 [---]	0.0000 [---]	
1/4th mile ET	0.0000 [---]	0.0000 [---]	
ET prediction	not possible	0.8208 [77.99]	
330' mph	0.00	0.00	
660' mph	78.74	75.46	
Time slip	0.00	0.00	
Comments	Insert here your time slip comments.		
Markers' values	[0] - [60] - [330] - [660] - [1000] - [1320]	[0] - [60] - [330] - [660] - [1000] - [1320]	
Tachometer readings			
Maximum rpm	0	8082	
Maximum temp: Cyl head	0.00	206.46	
Maximum temp: EGT	0.00	1240.36	
Comments	Insert here your run readings comments.		
Settings			
Launch: Cyl head temp	154.40	131.00	
Launch: Exhaust temp	693.69	665.47	
Launch: rpm	2617	2692	
Tire pressure (both)	0.00	0.00	
Comments	Insert here your run settings comments.		
Conditions			
Wind direction	200	140	
Wind speed	7.00	4.80	
Weather	Partly Cloudy	Cloudy	
Temperature	68.5	62.0	
Humidity	0.00	0.00	
Barometer	0.00	0.00	
Corrected air factor	0.000	0.000	
Density altitude	0.0	0.0	
Air density ratio [%]	0.000	0.000	
Dew point (degrees)	0.000	0.000	
Comments	Insert here your weather information comments.		

6.3.1 – Run Info

This window lets you enter general information on the performed run.

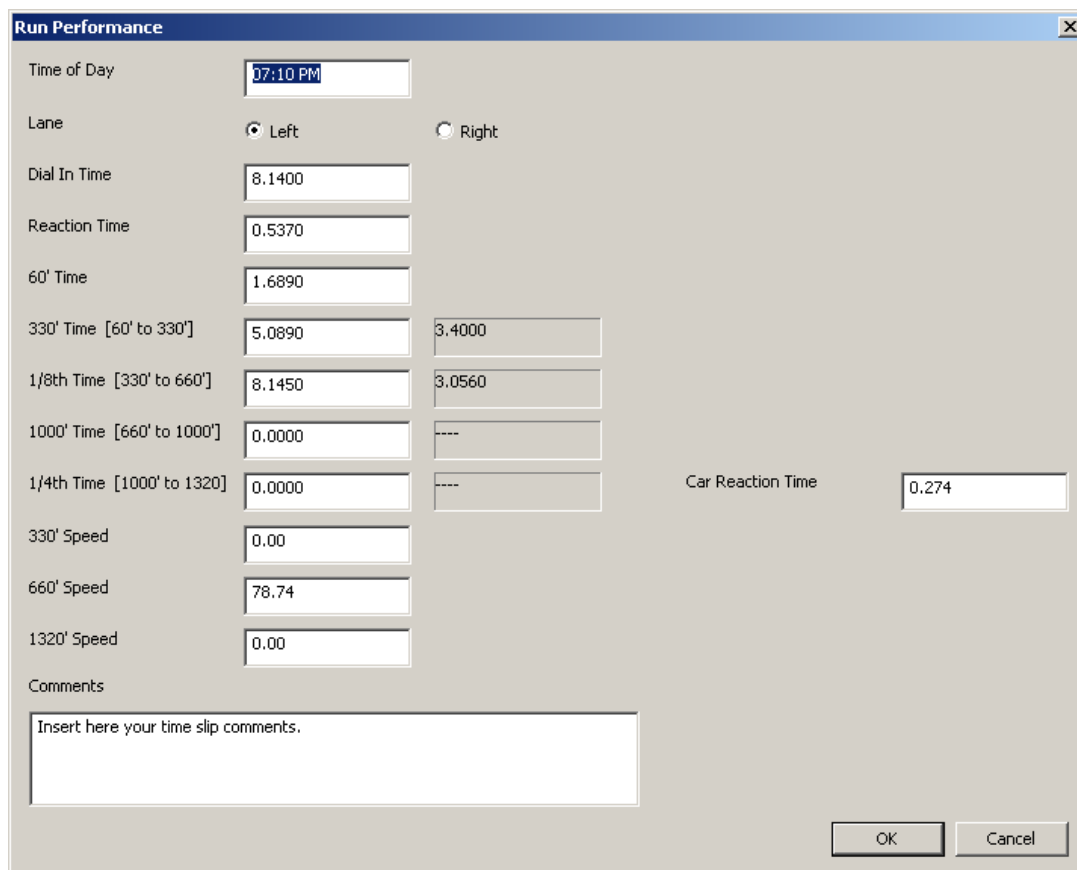


The 'General Information' dialog box contains the following fields and controls:

- Event date:** A date picker showing 'Sat 11 08 2003'.
- Run type:** Three radio buttons: 'Time trial' (selected), 'Qualification', and 'Elimination'.
- Run name:** A text box containing 'TR1'.
- Drive gear teeth:** A text box containing '14'.
- Driven gear teeth:** A text box containing '96'.
- Wheel circumference:** A text box containing '[inches]'.
- Comments:** A large text area with the placeholder text 'Insert here your run comments.'.
- Buttons:** 'OK' and 'Cancel' buttons at the bottom right.

6.3.2 – Time Slip

You can store all the information bound to the time slip, that, as already explained, affect the time plot.



Run Performance

Time of Day: 07:10 PM

Lane: ☒ Left ☐ Right

Dial In Time: 8.1400

Reaction Time: 0.5370

60' Time: 1.6890

330' Time [60' to 330']: 5.0890 3.4000

1/8th Time [330' to 660']: 8.1450 3.0560

1000' Time [660' to 1000']: 0.0000 ----

1/4th Time [1000' to 1320]: 0.0000 ----

330' Speed: 0.00

660' Speed: 78.74

1320' Speed: 0.00

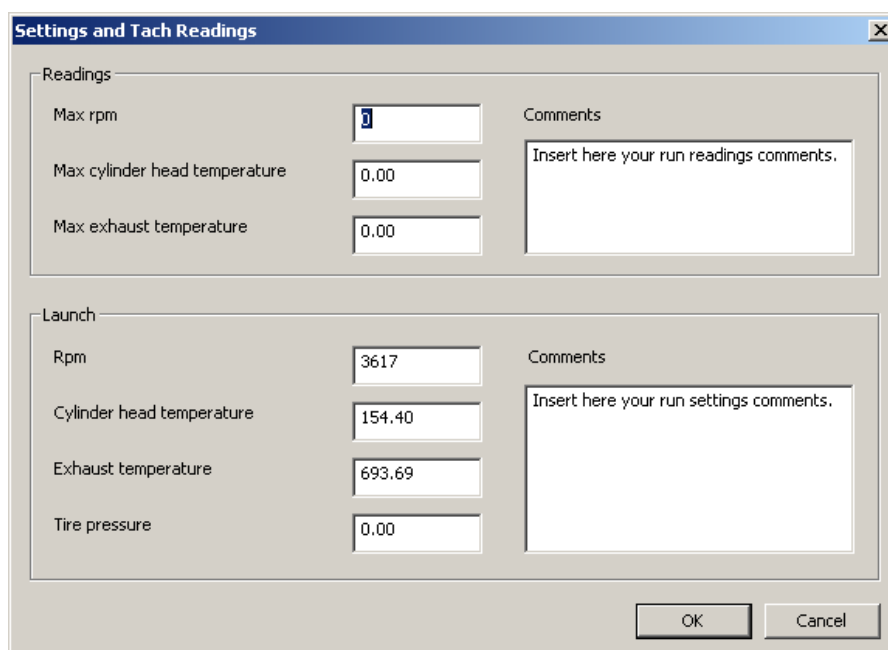
Car Reaction Time: 0.274

Comments: Insert here your time slip comments.

OK Cancel

6.3.3 – Tachometer

You can store all the readings of the tachometer that matter most, even at launch.



Settings and Tach Readings

Readings

Max rpm: 0

Max cylinder head temperature: 0.00

Max exhaust temperature: 0.00

Comments: Insert here your run readings comments.

Launch

Rpm: 3617

Cylinder head temperature: 154.40

Exhaust temperature: 693.69

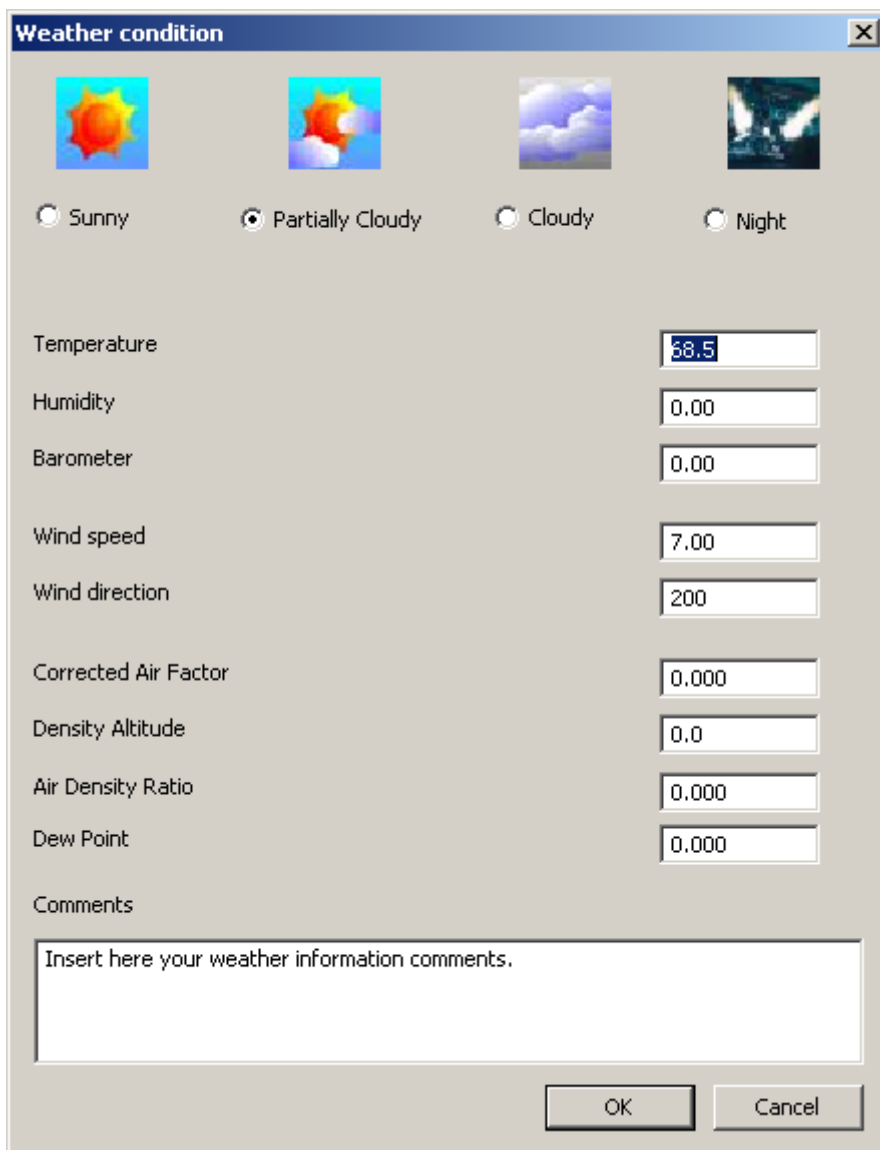
Tire pressure: 0.00

Comments: Insert here your run settings comments.

OK Cancel

6.3.4 – Weather

You can remember all the important information coming from a weather station.

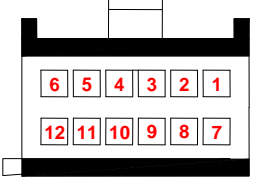
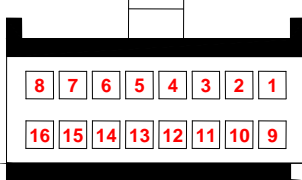


The dialog box is titled "Weather condition" and contains the following elements:

- Four weather icons: Sunny (sun), Partially Cloudy (sun and clouds), Cloudy (clouds), and Night (moon and stars).
- Four radio buttons corresponding to the icons: ☐ Sunny, ☒ Partially Cloudy, ☐ Cloudy, and ☐ Night.
- Input fields for the following weather data:
 - Temperature: 58.5
 - Humidity: 0.00
 - Barometer: 0.00
 - Wind speed: 7.00
 - Wind direction: 200
 - Corrected Air Factor: 0.000
 - Density Altitude: 0.0
 - Air Density Ratio: 0.000
 - Dew Point: 0.000
- A text area for comments with the placeholder text: "Insert here your weather information comments."
- OK and Cancel buttons at the bottom right.

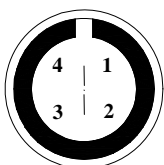
Appendix “A” – Technical draws

A.1 – MXL/EVO3 QM Pista: AMP female connector

Pin	Signal	Pin	Signal	Connector draw
1A	GND	1B	Analog input 4	
2A	9-15V Battery input	2B	V reference	
3A	CAN 1- (ECU interface)	3B	Analog GND	<p>12 Pins AMP female connector pinout (Labelled as “A”) – Contacts insertion view</p>
4A	CAN 1+ (ECU interface)	4B	Analog input 3	
5A	RS232 TX (ECU interface)	5B	Analog input 2	
6A	RS232 RX (ECU interface)	6B	V reference	
7A	USB D-	7B	Analog GND	<p>16 Pins AMP female connector pinout (Labelled as “B”) – Contacts insertion view</p>
8A	RPM 150-400V coil - RPM square wave >8V	8B	Analog input 1	
9A	+ VB	9B	Analog input 8	
10A	GND	10B	USB D+	
11A	+ VB	11B	Analog GND	
12A	Speed	12B	Analog input 7	
		13B	Analog input 6	
		14B	V reference	
		15B	Analog GND	
		16B	Analog input 5	

C-Acquisition switch channel

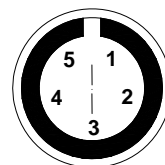
Pin	Function	Pin	Function
1	Reserved	3	Reserved
2	GND	4	Start acquisition switch



4 Pins female Binder connector pinout
(Labelled as “C”): external view

D-CAN for Expansion Modules

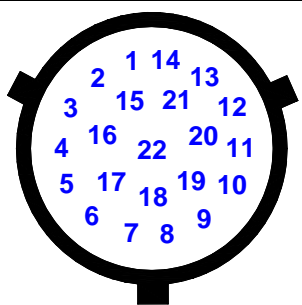
Pin	Function	Pin	Function
1	CAN 0+	4	CAN 0-
2	GND	5	9-15V Battery input
3	+VB		



5 Pins female Binder connector pinout
(Labelled as “D”): outside view

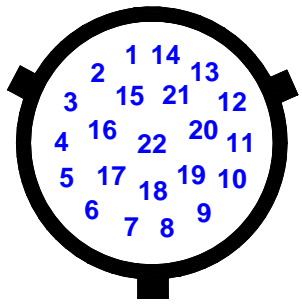
A.2 – MXL QM Pro: 22 Pins Deutsch connector

Kindly notice there are some differences from **EVO3** wirings, evidenced in red.

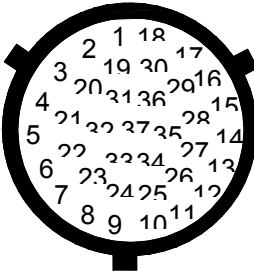
Pin	Signal	Pin	Signal	Connector Draw
1	+ VB (50 mA max)	12	GND	 <p>22 pins Deutsch male connector pinout (Labelled as "A"): contacts insertion view</p>
2	GND	13	+ VB for Ext. exp. modules (350 mA max)	
3	CAN 0+ (Ext. exp. modules)	14	MEM	
4	CAN 0- (Ext. exp. modules)	15	VIEW	
5	Speed 3	16	Ext. Gear Flash	
6	Speed 4	17	RS232 RX (ECU interface)	
7	USB D+	18	RS232 TX (ECU interface)	
8	USB D-	19	GND	
9	GND	20	CAN 1+ (ECU interface)	
10	+ VB (50 mA max)	21	CAN 1- (ECU interface)	
11	GND	22	9-15 V Battery input or Gear Flash power supply (no fuse)	

A.3 – EVO3 QM Pro: 22 Pins Deutsch connector

Kindly notice there are some differences from **MXL** wirings, evidenced in red.

Pin	Signal	Pin	Signal	Connector Draw
1	+ VB (50 mA max)	12	GND	 <p>22 pins Deutsch male connector pinout (Labelled as "A"): contacts insertion view</p>
2	GND	13	+ VB for Ext. exp. modules (350 mA max)	
3	CAN 0- (Ext. exp. modules)	14	Ext. Gear Flash	
4	CAN 0+ (Ext. exp. modules)	15	Input 1	
5	Speed 3	16	Input 2	
6	Speed 4	17	RS232 RX (ECU interface)	
7	USB D+	18	RS232 TX (ECU interface)	
8	USB D-	19	GND	
9	GND	20	CAN 1+ (ECU interface)	
10	+ VB (50 mA max)	21	CAN 1- (ECU interface)	
11	GND	22	9-15 V Battery input or Gear Flash power supply (no fuse)	

A.4 – MXL/EVO3 QM Pro: 37 Pins Deutsch connector

Pin	Signal	Pin	Signal	Connector Draw
1	9-15 V Battery input	20	Analog input 12 (0-5V max)	
2	Analog input 1 (0-5V max)	21	V Reference (5V – 30 mA)	
3	Analog input 2 (0-5V max)	22	V Reference (5V – 30 mA)	
4	Analog GND	23	Analog input 10 (0-5V max)	
5	Analog GND	24	V Reference (5V – 30 mA)	
6	V Reference (5V – 30 mA)	25	Analog input 9 (0-5V max)	
7	V Reference (5V – 30 mA)	26	Analog input 8 (0-5V max)	
8	Analog input 3 (0-5V max)	27	Analog GND	
9	Analog input 4 (0-5V max)	28	GND	
10	Analog input 6 (0-5V max)	29	+ VB (*)	
11	Analog GND	30	Speed 2	
12	RPM Square Wave 4-8 V	31	Analog GND	
13	RPM Coil – Sq. Wave >8 V	32	Analog input 5 (0-5V max)	
14	+ VB (50 mA max)	33	Analog input 7 (0-5V max)	
15	GND (Battery input)	34	V Reference (5V – 30 mA)	
16	+ VB (*)	35	Analog GND	
17	+ VB (50 mA max)	36	Speed 1	
18	GND	37	Start acquisition switch	
19	Analog input 11 (0-5V max)			

37 pins Deutsch male connector pinout (Labelled as "B"): contacts insertion view

(*) The total power consumption sum of pin 16 and pin 29 must not exceed 50 mA (max current sink).

Analog input 1-12 Voltage = 0-5V max , V Reference = 5V 30 mA